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and Building Age

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60th Year

Vol. 60—No. 12

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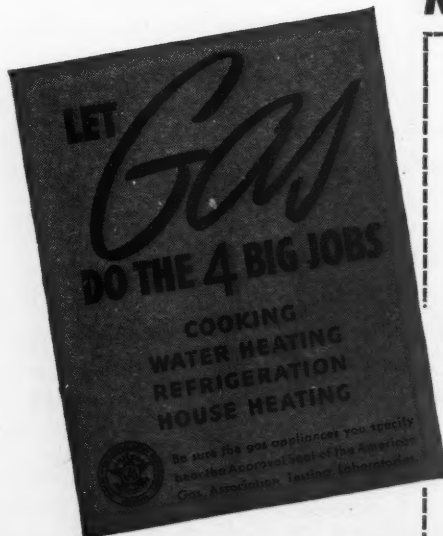
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PUBLISHER'S PAGE

A Six Months' Improvement In Business

PROSPECTS of business in general, and building in particular, are the best they have been in the nine years since the Great Depression began. The decline of general business that started in the spring of 1937 stopped in May, 1938, and there has been a steady improvement throughout the subsequent six months. The upturn has been accompanied and largely caused by an increase in building. Contracts for building have been larger ever since the middle of 1938 than in 1937, while the volume of the country's total business in 1938 did not begin exceeding its volume in 1937 until the middle of November.

This is the fourth marked upturn in business during the depression. The first was in the last one-third of 1932, and was stopped by the banking crisis. The second was in the four months April-July, 1933, inclusive, immediately after the banking crisis, and was followed by two years of stagnation while the New Deal was trying its first "recovery and reform" experiments. The third and longest upturn began in the summer of 1935, soon after the Supreme Court destroyed N.R.A., and continued twenty-two months until interrupted by the beginning of the "recession" in June, 1938. This "recession" made business less throughout the first half of 1938 than six years before in the first half of 1932. While the 20 per cent more-than-seasonal increase since last May has raised it to about its level at the end of 1935, general business would still have to improve 20 per cent more to be as good as in the first quarter of 1937 and at least 60 per cent more to be as good as ten years ago in 1928.

THE reasons why prospects of business are the best now since the beginning of the depression are twofold. First, lagging of the durable goods industries prevented previous upturns from being greater and more lasting; and business in the durable goods industries has improved relatively more during the last six months than in any equal time since the depression's real bottom was reached in the late summer of 1932. This is shown by the expansion of building and steel production. Second, a

majority of the people registered a vigorous protest at the national election on November 8 against the government and labor policies mainly responsible for the failure of recovery and for the recent "recession." Most of the men they elected to Congress are sure to be unsympathetic toward the policies of the starry-eyed reformers whose efforts for five years to "make America over" have been successful only in making America poorer.

BUT let us not deceive ourselves. Prosperity has not been restored, nor has anywhere near enough been done to restore it. Apparently most of us have become so used to depression that very few realize how bad business really still is, how much it can be improved, and how much the improvement in it that is possible would benefit all classes, especially the "one-third that are ill-fed, ill-clothed and ill-housed."

This is the first time in the entire history of the United States when business has not been *much better* at the end of a decade than at its beginning; and yet business as a whole in this country is now at least *one-third worse* than it was ten years ago in 1928. That this is demonstrably true is a national disgrace—a disgrace to the present generation and every class of it, but especially to those who have favored the policies responsible for it. We have enough natural resources, man-power and equipment to produce twice as much income and goods for the people and every class of them. All we have seemed to lack is the brains.

Perhaps we have not really lacked them. There are encouraging signs that we have had them and are at last beginning to use them. We will have to use them much more than we have for a long time to restore prosperity in spite of the burden of government debt we have accumulated while making the world's greatest fools of ourselves.

Samuel O. Dunn

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AMERICAN BUILDER

AND BUILDING AGE

"Buyer-Approved"

ALWAYS the home building industry should keep in mind the *buyer*. What do the people want? What size, style and cost of house will interest the actual and logical prospects for new homes? What type of promotion, salesmanship and performance will appeal to these prospects—causing them to *have confidence* in their own cherished dreams of home ownership and in their gathering determination that *now is the time to build*.

Last month on this page we registered our vote against sensationalism and freak house designs as promotion helps to home building. Evidently others in the building industry stand with us on this proposition. One of the letters commenting on this editorial was received from Geo. D. Hawkins of Toledo, a district secretary of the Ohio Association of Retail Lumber Dealers. He writes:

"We wish to express our appreciation of the editorial 'Sensationalism Does Not Encourage Home Building' appearing in the November *Builder* and to commend you for the courageous way in which you have handled this subject. We are glad to see an outstanding publication such as yours challenge the trend toward the extremes in house designs which has reached epidemic proportions in recent months."

Another letter expresses an architect-builder point of view. William R. Bajari of Marquette, Mich., writes:

"Just a note to state that I think the 'experts' are once again fooling the American public, this time through the medium of magazine —."

Constructive Promotion Urged

Now, *American Builder* had no specific popular magazine, architectural competition or demonstration home in mind when marshalling the facts against "freak houses" and journalistic sensationalism as home building promotion. There have been too many examples in the past few years to permit any cataloging of them.

Rather, our suggestions were and are constructive and refer to the entire scope of sales-minded effort in the home buying and building field. We stand for the sensible and winsome in home designs—something that squares with the dream-home picture held by the average mid-income family—not something fantastic, impractical and over-costly, that only serves to throw confusion into the buyer's mind.

Buyer-Approved Homes is what this publication has in mind as a sound objective for promotion and sales efforts by all the allied forces of the building industry. The acid-test of any selling program today is how does it square with what the people want. There is a strong "mass-mind movement" for home building today which

is each month carrying home building totals to new heights. The outlook for 1939 home building is bright. Confidence-building publicity and promotion can accomplish great results under such favorable conditions.

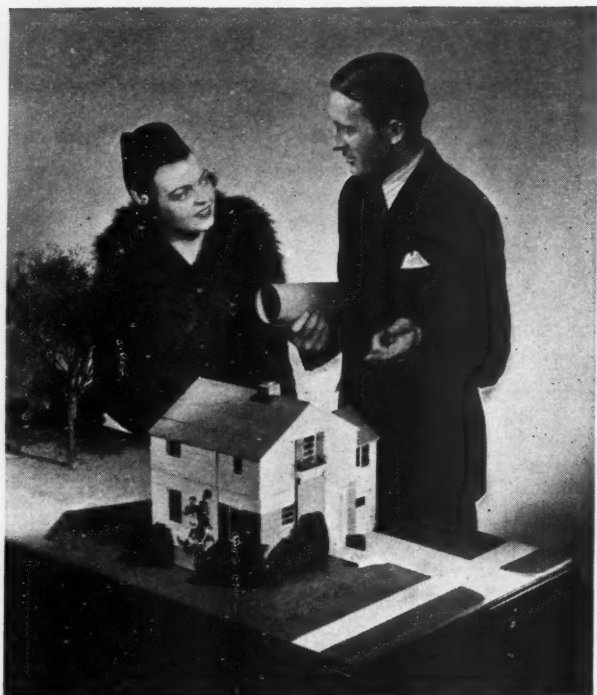
Come Out of Hiding!

With the present upturn in business and the mass-mind-movement of the people toward building—both new home building and the repair and remodeling of old homes—there will be a lot of folks looking up contractors, carpenters, masons, roofers, building supply dealers, architects. They will want building service but, in general, will have a hard time locating just the experienced building firm or skilled mechanic or well stocked supply house to consult with and employ. This is because building industry men are just naturally poor advertisers. They seem to be in hiding rather than out shouting their wares and services!

One of the best ways for building contractors, jobbing carpenters and other specialists in building service to advertise and make themselves known to prospective customers is the use of space and proper listings in the local telephone directory. This advertising doesn't cost much, yet is very productive of business because the people are accustomed to turn to the classified phone book for any special service or commodity they are in need of. Building service is only occasionally wanted by any one individual, so he has little previous knowledge and has to rely pretty largely on the phone directory service. The building firms that are properly listed and advertised there get the business.

In spite of this obvious fact, it is well known that a good many building contractors avoid telephone calls—even to the extent of keeping the phone number out of the general directory, or of having it listed in the wife's name. This is probably to keep off "the salesmen," but it does more harm than good if it also keeps prospective customers away. Come out of hiding and let the buying public know what you have to offer!

Another item of interest in connection with the classified telephone directories is the Trade Mark Service that is rapidly developing. Several of the well known and nationally used trade marked lines of building materials and building equipment are now carried in the local phone books, so that buyers can easily locate the local dealer or distributor. This is a service that is being used and appreciated by contractors, architects and property owners. The trade marked lines are usually the lines of dependable quality, and the building industry is more and more placing its dependence on them.



ACCURATE SCALE MODELS of house designs are used in selling prospective buyers.

BUFFALO TRIES OUT Certified Homes Plan



IN BUFFALO, N. Y., a lively group of architects, contractors, material and financing people are trying out a new home building program under the leadership of the Architects' Certified Homes Association. Under the aggressive direction of John E. McNamara, executive director, the Association has set up a plan providing for: (1) A central headquarters for local house plans and specifications; (2) a centralized method of merchandising houses, using small scale models; (3) inspection and certification of houses.

The plan was officially presented to the public and the nation at large at a Housing Congress held in November at which the first showing of the Certified Home models was made and the plan described by prominent speakers.

Briefly, the Certified Homes plan as it operates in Buffalo provides for a local bureau to provide plans, specifications and supervision at low cost. Member architects are asked to prepare and submit to the Association complete plans and specifications ready for bids on houses to sell from \$3,000 to \$10,000. Thus, a local file of house plans and designs, including popular designs from a large number of sources, is established. Cleverly built scale models of a number of the more popular types of designs are built and are put on display not only at Association headquarters but at local display points, such as the local utility office and department store windows.

To carry on the active work of the Association a paid salesman will be employed to contact prospective buyers and create sales. A supervisor or inspector will also be employed, who will see that plans and specifications provided by the Association are lived up to and will make six inspections during the course of construction. When the house has been completed and approved, it will be certified by the Association and a bronze seal attached.

The program received its initial impetus from a group of active local members of the American Institute of Architects. In its early stages it has appeared to be most readily adaptable to services of individual home buyers, who through this plan are able to obtain plans and supervision at moderate cost. The preliminary fee basis set up for this complete service to a home owner is \$100 on a \$4,000 to \$4,500 house, \$125 on a \$5,000 house, \$150

on a \$6,000 house and \$175 on a \$7,000 house.

The architect is reimbursed on the following basis: after handling costs such as blue prints, overhead, inspection, etc., are paid, the balance is divided into two equal parts, one-half of which goes to the architect who provided the plans. The other half goes into the general fund for maintaining the Association activity. It is thought that a set of plans will be used a number of times so that eventually the architect will get a fair return for his work.

Operative builders are urged by the Association to also use the service, and it has been endorsed by a number of prominent local builders, as well as by the Niagara Frontier Builders' Association. However, participation by operative builders has not been extensive, and in some quarters the program is viewed as an attempt by the architects to "get control" of the local home building business.

An important feature of the Association's activity is the fashion in which it serves as a central home merchandising headquarters. An extensive display of modern residential materials and equipment is maintained at the Association headquarters, as well as a number of the scale models of houses designed for local use. The officers of the Association plan later on to sponsor demonstration houses, with large billboards directing the public to the houses.

Another feature is a local weekly real estate and home building page in one of the Buffalo newspapers in which the Association takes an active part. An extensive publicity program in newspapers, over the radio and through the schools is to be carried on. Model homes are to be built in the technical departments of some of the Buffalo High Schools, and an actual full-size house will be built by the McKinley Vocational School.

The Buffalo program is in many respects similar to the Federal Home Building Service Plan sponsored by the Federal Home Loan Bank Board among its 4,000 lending institution members. The Board has recently announced extension of its program to include an inspection service and the issuing of a certificate of registration by the local financial institution which is recorded on the records of the Federal Home Loan Bank Board.

Planning Profitable Subdivisions

Subdivisions Planned as Neighborhoods Are More Profitable to Developers, Better Security for Investors, and More Desirable to the Home Owners*

THE planning and successful marketing of a residential community should be approached with a thorough knowledge of the problems involved and the best means of meeting them. The requirements of good and convenient living must be met, costs must be kept within the buying power of those to be housed and the property marketed in a manner that will bring a steady and safe return on the money invested.

The following suggestions by the FHA are the result of the analysis of hundreds of residential neighborhoods located in all parts of the United States. To the experienced subdivider much of the text will appear to be elementary. It is hoped, however, that every developer will find some constructive idea that will be of assistance to him.

Ultimate success of any housing development depends upon its ability to meet an existing market. Justification for any subdivision is based upon the volume and type of local housing needs. A well conceived subdivision is located, planned, and developed to attract a definite group of potential purchasers.

The size of the development should be such that it can be completed and sold within a period of time which will avoid the financial burden of carrying vacant land. Sales cost should be minimized by designing the tract and the houses to appeal to a large proportion of the known housing market.

In the past the speculative subdivision of land and sale of lots was often successful. Today, however, the buying public has become more neighborhood conscious and is less interested in the speculative purchase of lots. It is interested in the buying of improved properties—a good house on a well located and landscaped lot—in a well conceived community. Alert builders, therefore, will not attempt lot sales, but will adopt programs that result in the building of desirable communities.

Every subdivision is definitely related to the community

*THIS article is condensed from Federal Housing Administration Technical Bulletin No. 7, "Planning Profitable Neighborhoods."

in which it is located. Developers should cooperate with their local planning authorities so that their projects will conform to the city plan. A study of city growth and population movements, especially of the income groups to which the subdivision is intended to appeal, will avoid the premature production of dwelling sites as has been done in the past.

The topography of a selected location should be considered in relation to the proposed price range, since the physical character of the land has a direct bearing on the cost of the development. This cost, together with the cost of the land, must permit the selling of properties at a reasonable profit and within the purchasing ability of prospective home owners.

Location involves the question of accessibility to employment, recreational areas, commercial centers, and schools. The adequacy and cost of public transportation,



THE attractive character of this street results from a simple though consistent subdivision design conforming with the principles as

set forth by FHA and outlined in this article. A variation of from 2 to 10 feet in the setback of the houses has added to good street appearance. In the lower right corner of the aerial view above, this same group of houses is seen as it appears from the air.

street improvements, water supply and sewage disposal, health and safety services, and the tax rate have an important bearing on the suitability of a given site for a definite housing demand.

Project location should be approached from the point of view of suitability of the site for a specific purpose rather than an attempt to find a use for a given tract.

Neighborhood Character

Neighborhoods reveal distinguishing characteristics. The initial character of a neighborhood is established by its location, accessibility, layout, landscaping, and architecture. The marketability of properties and the stability of neighborhoods are improved by adequate public services, enforced zoning, subdivision regulations, and suitable restrictive covenants. The quality of the elements which determine neighborhood character, for the most part, is subject to control by the developer. Where they are slighted in the construction phase of a subdivision's development, experience invariably points to a constantly changing land use, rapid turn-over in ownership and occupancy, and depreciating land values. When, on the other hand, all these factors are carefully co-ordinated the attractiveness and stability of a neighborhood are established. Its ultimate appeal, however, will be determined in large measure by the pride of the residents in maintaining the physical appearance of the neighborhood.

Design

Good subdivision design takes into consideration the size and shape of the tract, topography, soil, drainage, vegetation, prevailing winds, existing streets, and other improvements, as well as legal restrictions and proposed official city or regional plans.

The plan of a small subdivision will, to a great degree, be determined by its surroundings. In the case of a large tract, however, it is possible to establish a definite neighborhood environment and to protect it against unsightly outside surroundings and inside influences that depreciate land values.

Streets in a well designed subdivision are planned in relation to surrounding areas, for convenience within the area, with reasonable grades, for safety of traffic and pedestrians, and for economy in construction cost.

The gridiron plan is generally costly and results in a community of monotonous appearance. Through proper design, rectilinear planning, especially on level ground, however, can frequently result in a community of good appearance and with cost advantages. On sloping ground the curved street layout which conforms to differences in ground levels is superior to rectangular platting because it reduces grading operations, avoids steep grades, permits better use of the land, and is better adapted to an economical installation of the sewage system. This is shown in Fig. 3 examples on opposite page.

Recreational areas where needed should be included in the original design. Provision also should be made for the planting of long lived street trees.

A simple and straightforward subdivision plan which is designed with reference to the foregoing principles is much to be preferred over one that is highly complicated in its streets and lot arrangement. A minimum length of streets with their accompanying utilities, together with a maximum number of well arranged building sites, results from a skillfully designed subdivision layout.

Utilities

The use of individual wells and septic tanks is not good practice except where public mains are not available, and then only when large lots are planned. To maintain healthful sanitary conditions, it is highly desirable to make use of public water supplies and sewer mains whenever possible.

Community water supply systems are often feasible and fill a definite need for a satisfactory water supply when public mains are not available. The operation of these systems is satisfactory when

FHA PRINCIPLES FOR

Discourage Heavy Through Traffic . . . Plan for Extension of Major Streets . . . Traffic Should Flow Toward Thoroughfares . . . Minor Streets Should Enter Major Streets at Right Angles . . . Avoid Planning of Dead-End Streets . . . Streets Should Fit Contours of Irregular Land . . . Short Blocks Are Not Economical . . . Long Blocks Require Crosswalks Near Center . . . Plan Commercial Sites Where Needed . . . Provide School and Church Sites . . .

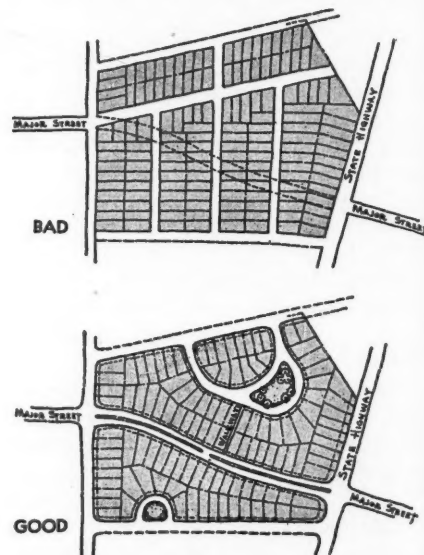


FIG. 1—Examples of Good and Bad practice in planning for extension of major streets.

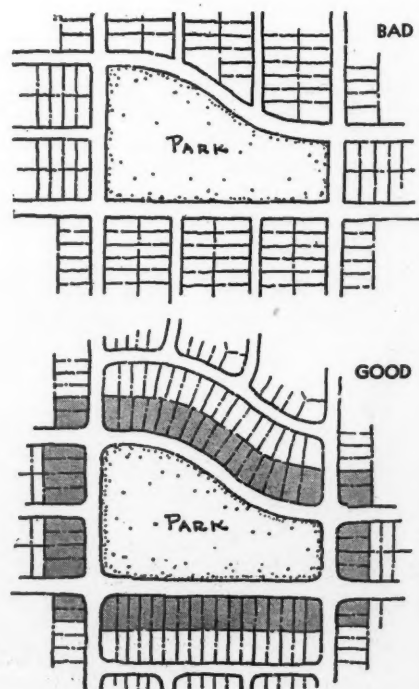


FIG. 2—Lots should face desirable views.

BETTER SUBDIVIDING

- Parks Are a Definite Community Asset . . .
- Preserve Natural Features for Improved Appearance . . .
- Deep Lots Are Wasteful . . .
- Plan Lots of Adequate Width . . .
- Avoid Sharp-Angled Lots . . .
- Plan Wider Corner Lots . . .
- Make Lot Lines Perpendicular to Street . . .
- Plan Lots to Face Desirable Views . . .
- Protect Lots Against Adjacent Nonconforming Uses . . .
- Protect Residential Lots Against Major Street Traffic.

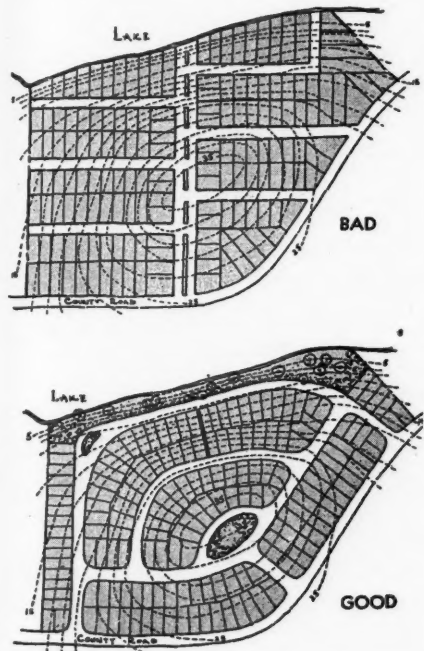


FIG. 3—Streets should fit the land contours.

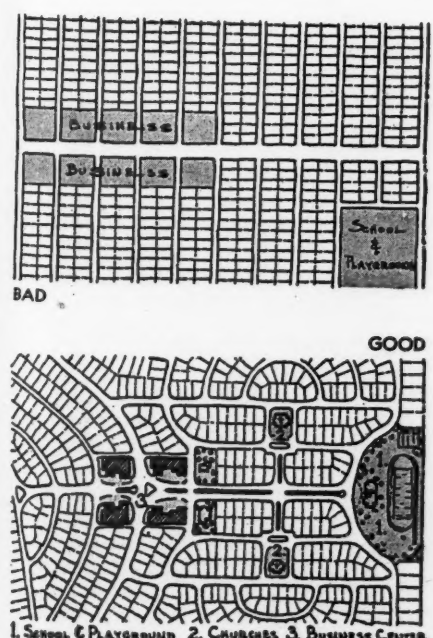


FIG. 4—Properly relate public building sites.

properly installed and the cost of installation is generally less than the cost of individual wells and automatic pumping apparatus.

Design of the houses should consider the requirements of the people to which the subdivision is intended to appeal. Sufficient variety in exterior design should be used to avoid monotony and yet retain a harmonious character. Substantial construction and equipment which assure low maintenance and operating cost as well as good planning are of primary importance to the prospective purchaser of a home.

Location of the individual houses should be done with regard to orderly and attractive appearance. The grouping of houses and the use of varied setbacks often produces a more pleasing result than does the use of uniform setbacks and spacing.

The character of the houses, their location and their landscaping largely determine the character of the neighborhood and whether or not the properties will have sufficient appeal to be salable to a large number of buyers.

Marketing

Maximum profit in subdivision development usually depends upon the selling of all properties in the tract. Effort on the part of the developer to guard against conditions which reduce the marketability of properties contributes to the financial success of the project.

Scattered sales over a large area are seldom profitable and are accompanied by unnecessary financial risk. It is not advisable to open more of the subdivision than is justified by anticipated sales. If the tract is developed in sections, as warranted by the demand, a group of a few houses will gradually grow into a sound community; the capital investment for improvements will be less; and the risk of financial loss will be minimized. A marketing program of this type permits the planning of the entire tract but avoids increased taxes, interest charges, and capital investment on idle improvements.

Zoning and Restrictions

It is essential that every residential neighborhood be protected against adverse influences which may occur through undesirable land uses. The best means of such protection is through properly drawn and administered zoning regulations and by restrictive covenants that are placed as blanket encumbrances against the entire tract. These protective measures help to maintain a stable market condition within the area and to assure purchasers that their investments will not be injured by the acts of selfish or thoughtless neighbors. Regulation of lot sizes, location of structures and their design, and prohibition of nuisances are good business for both buyer and seller.

It is important that the developer distinguish between zoning and restrictive covenants. The first derives its authority from an exercise of police power, the other through a contractual obligation. They go hand in hand, one supplementing the other, and both are needed.

Technical Service

Successful subdivision development depends upon the ability of the developer to obtain the most desirable and appealing community with the least capital expenditure. The arrangement of streets, cost of utilities, the shape and size of the lots that will prove the most profitable, as well as other factors which make a neighborhood desirable and financially successful, are of such importance that the use of technical assistance will prove an economy. Principles for better sub-dividing practice are outlined at top center of these pages with some illustrations of good and bad practice indicated in the sketches which are taken from FHA Technical Bulletin No. 7.

The services of a qualified subdivision designer will contribute to the economical and financial success of a community development. Skillful planning can result in a development that will appeal and find ready sale to a large number of people. The reputation and prestige of developers are based largely upon the building of communities that are sound real estate investments.

How to Build Low-Cost Plank Walls and

Simpler and Less Expensive Methods of Floor and Wall Construction Are Demonstrated in N.L.M.A. House No. 8

IN BUILDING the eight demonstration homes for the 1938 National Small Homes Demonstration, Wilson Compton, secretary-manager of the National Lumber Manufacturers Association, approved making a number of construction method experiments and investigations in behalf of "lower-low-cost" house construction. During the building of these houses, all by the same contractor and on adjoining sites, accurate records of time and materials were kept by L. M. Stevens, architect and job supervisor. This made reliable comparisons possible and the results of one floor construction investigation can now be reported.

Of the eight homes, Demonstration House No. 8, costing \$2,563.69 for material and labor, differs radically in most all respects from that of the traditional lumber-built house.

The first outstanding and unusual feature of this home is the construction of its wall. Instead of the conventional framing, sheathing and exterior siding, the walls are composed of vertical 2 x 6 members, each edge of which is grooved. By alternating the planks back and forth, the edge of every alternate plank fits

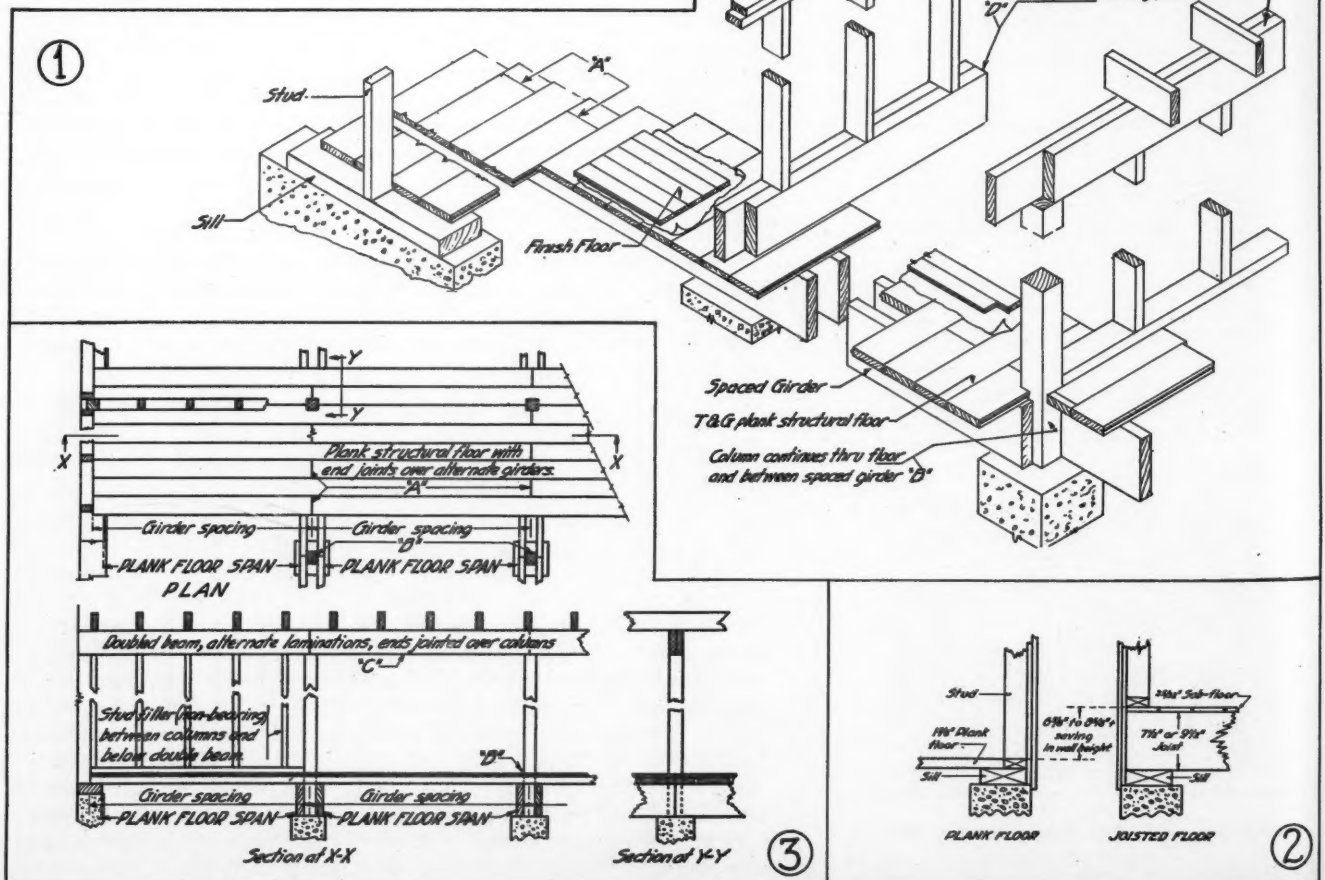
into the groove of its adjacent neighbor and every other plank extends approximately one-half inch beyond the surface of the next member. The result is a continuous wood wall 2 inches thick, which when faced on the inside with lath or furring strips, or covered on the outside with siding, allows alternate air spaces at every other board.

This system of plank wall construction eliminates the three separate operations of framing, sheathing and application of exterior siding allowing a marked economy in the use of material. This is apparent as the amount of wood used in the wall is equal to the thickness of two ordinary boards, and the material required previously for the frame or skeleton of a home is automatically saved.

By actual comparison this studless wall saved 30 per cent in installation labor time, 18 per cent in lumber and 16 per cent of the cost of the standard type stud wall ready for lath and plaster, or 5 cents a square foot. Furthermore, the industry believes this type of plank construction is applicable to partitions and roof structures of small homes.

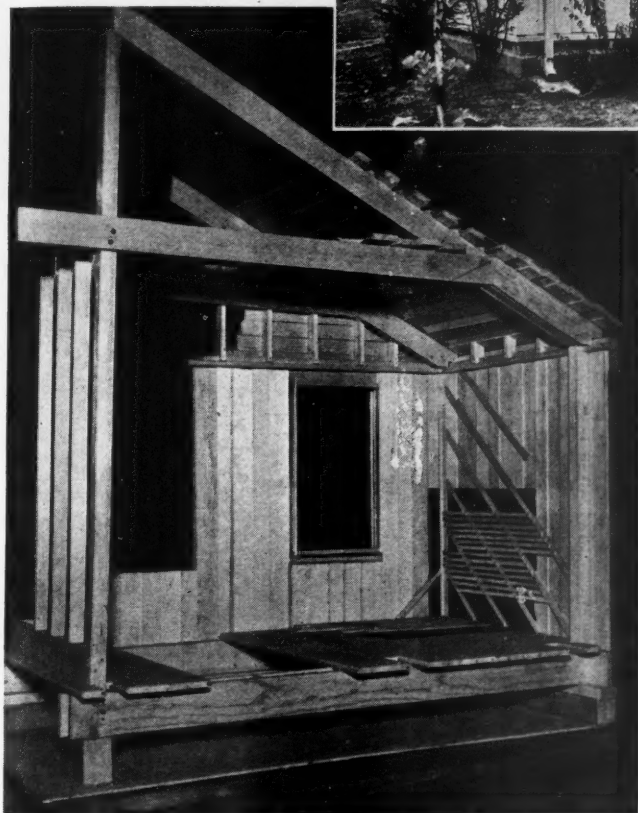
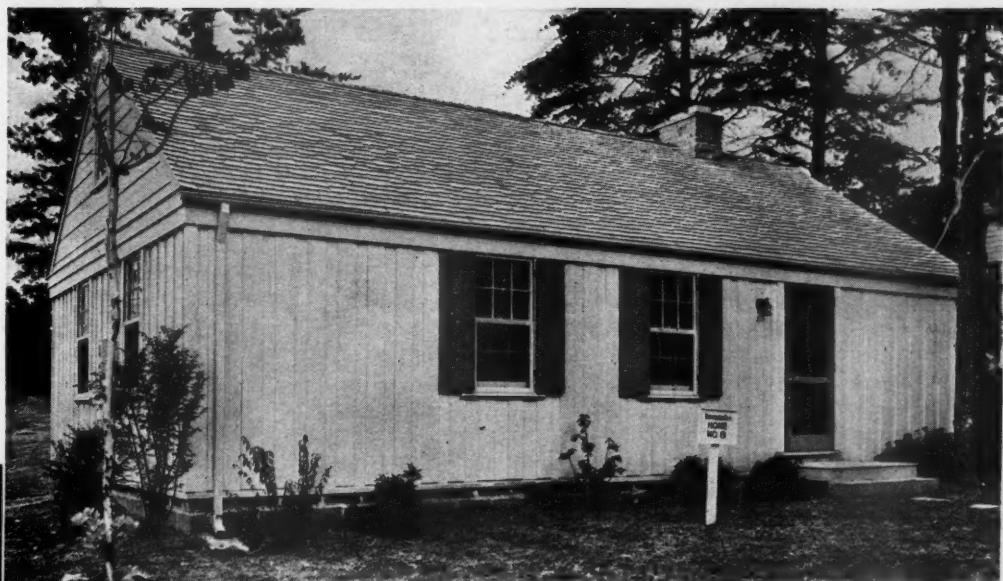
A second important construction feature is a plank sub-floor over beams spaced wider apart than is normally the case for joists, but a common practice in fac-

DETAILS of plank structural floor shown in perspective, Fig. 1. In Figs. 2 and 3 these details also appear in plan and section drawings.



Floors

RIGHT: National Lumber Manufacturers Association Demonstration House No. 8, constructed for either county or city living, employs practical low-cost plank walls as described in this article. The model illustrated below shows details of the plank wall, plank floor and plank roof type of construction.



tory construction. It is not so frequently encountered in floors built for house construction, probably because there have not been many opportunities to make exact comparisons with the standard already low-cost joisted construction floor. Such a floor of 2 x 6 D&M plank placed flatwise over girders spaced 6 feet on centers (5' 6" clear span) (Fig. 1), was built into one of the houses. The plank used were 12 feet long with the end joints of adjoining plank occurring over alternate beams (Fig. 1-"A"). Details of construction are shown in the illustrations. The comparison of this floor and a standard joisted floor is from the foundation top to the top of the rough floor and includes sills, headers, beams, sheathing, siding, bridging and man time.

Labor Savings

The plank floor required 26.4 per cent less labor time per square foot than the joisted floor. Everyone familiar with the house building processes has noticed, probably subconsciously, that nearly every structural unit used on the job, unless it is square in section, is usually laid on its wider side before being lifted or

tilted into its permanent place. If that is its normal position it is obvious that to place it in any other requires more time. This is true of floor joists which, placed on edge, require care in spacing, in alignment and securing in place, plus the placing of bridging. Leaving them on their sides, the easiest position in which to place them, immediately suggests the use of a plank sub-floor—suggests the way a floor should be built if labor saving is an object. The carpenter must handle twice as many pieces in a joisted floor as he does in a plank floor. There are several times as many nailing points in the joisted floor as the sub-floor is nailed on 16" centers where it crosses the joists. The plank were spiked to the girders which were on 6' centers. Cross-bridging must be placed for a joisted floor—not for the plank. In fact, a plank floor required 13.6 per cent less labor time per thousand board feet of lumber than did the joisted floor construction.

Material Savings

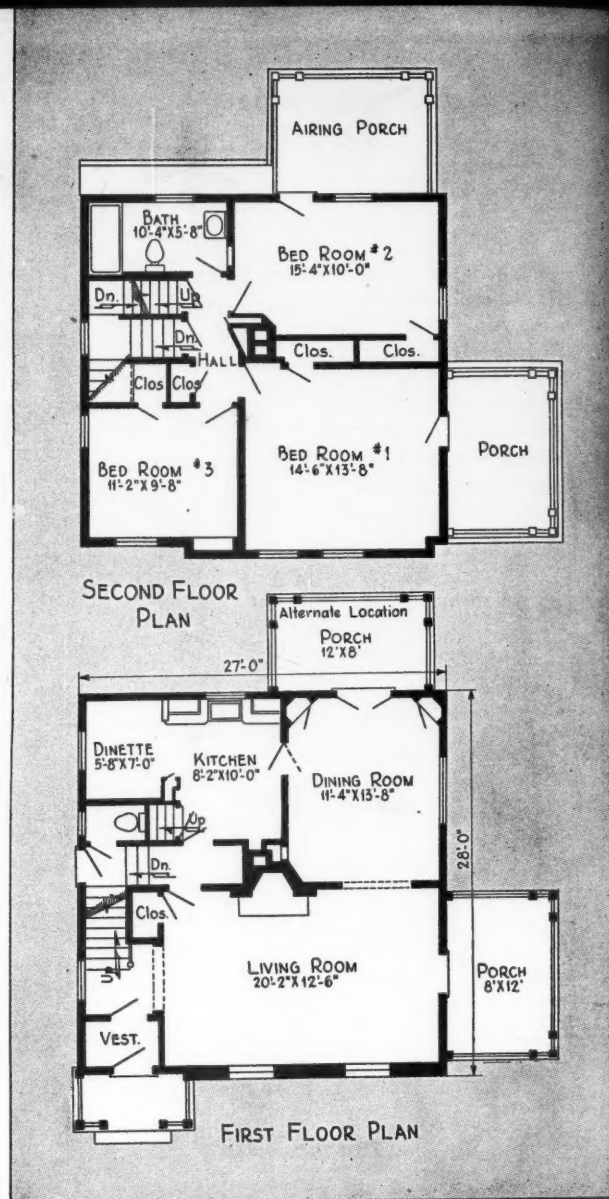
The plank floor required 14.7 per cent less lumber per square foot than the joisted floor. A plank floor reduces the overall thickness of the floor construction by the depth of the joist minus approximately one inch (Fig. 2). This means a reduction of the wall height and hence of the cubage of the building without shrinking the free cubage of the rooms, or an increase of headroom for the same overall building height. A reduction of the building height of 6 or 8 inches means a saving of more than one board foot of lumber per each linear foot of building circumference. This saving is represented by the sheathing and siding which would have been required. Further, a joisted floor requires cross-bridging; the plank floor does not. The joisted floor had a span of 12 feet and for the size joist used No. 1 Common grade was required. For the plank floor, with its shorter span, No. 2 Common was amply strong, amply stiff and cheaper in price. Other parts of the two floors were of the same grades. Material suitable for a plank floor is available anywhere and can be of a lower grade and hence lower priced. If a lumber dealer does not have it immediately at hand it is a simple process to put 2-inch planking through a machine and give it the tongue and groove. A minor additional charge for this operation does not increase the cost of the plank enough seriously to affect fundamental economies. Further, the plank floor is laid with practically no waste. (Continued to page 42)

Houses Put Together with Screw Nails Add to Quality Reputation of Ohio Builder

AT first glance the house shown below, with floor plans at the right, might appear to be just another attractive, well planned house. However, C. Erroll Jones of Cleveland, Ohio, builder and designer of this house, has created a splendid reputation for quality construction by using materials and accessories that assure added customer satisfaction.

He has built over 150 homes ranging in price from \$6,500 to \$25,000, and having studied architecture, he has been responsible for the design of 80 per cent of them. Since 1930 one of the extra value items going into Jones' houses has been Helyx drive screw nails. Asked if the extra cost paid, Mr. Jones has said: "To get the kind of work I do, a contractor has to establish a reputation for quality work. When I build a home, I know my reputation depends on the security, solidity and permanence I put into it. And the use of drive screw nails has helped me build up my reputation for quality work. Of course, in some of my houses I use both common and drive screw nails, but I always use the latter for stair work where the added security counts most. I particularly like them for siding and laying floors.

When questioned about any sales resistance to the added cost, Mr. Jones continued: "I make it a point to explain to all my customers that for approximately \$200 more I can build the average house screwed together at joists, sheathing, floors, roofing, siding and that additional cost will be saved many times over in repairs. Because there will be no coming back to the job for me on such things as squeaking floors, there is added profit."



AMERICAN BUILDER
True Cost FIGURES
FOR THIS HOUSE
ON PAGE

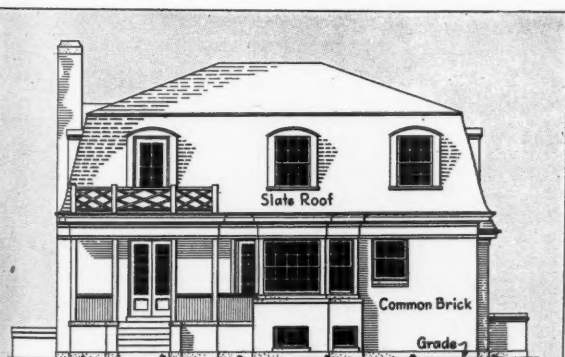
42

THIS neat 6-room early American home built by C. Erroll Jones, of Cleveland, uses stone on the first floor front with vertical boards and battens above, and the balance of the exterior in shingles laid with an uneven butt line. Plan is compact and entirely convenient. Unusual features include dinette arrangement off kitchen, dining room corner cupboards, living porch with deck in either of two locations, side or rear.

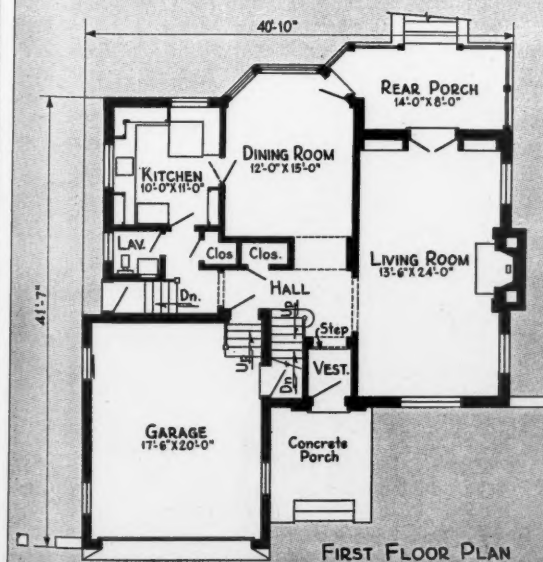


Unusual 7-Room Plan in Illinois Home

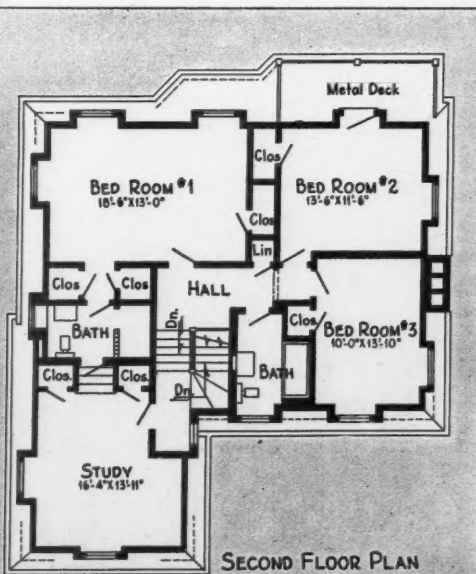
PICTURED above is an unusual French style design built in Kenilworth, Ill., by James Faulkner. The space economy of this house is very evident when front elevation showing attached two-car garage with decorative door treatment and low mansard roof line is contrasted with the interior roominess as indicated in the floor plan. Off the front entrance hall there are large living room, dining room well lighted by the wide bay, kitchen, lavatory, rear hall to grade entrance and access to garage and basement. A wormy chestnut paneled study is directly over the garage, and three good sized bedrooms with two baths are located on the upper second floor level. Storage space is most ample throughout.



REAR ELEVATION



FIRST FLOOR PLAN



SECOND FLOOR PLAN

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CONSTRUCTION highlights include common brick veneer painted with Medusa white, Bangor slate roof, Stanley garage hardware, L-O-F glazing, 4-inch Gimco mineral wool insulation throughout, Standard fixtures, oil-fired winter conditioning, and Red Seal wiring (outlets around living room every 18 inches and 87 more outlets in the balance of house).

Cape Cod Design Offers Wide Adaptability

Wichita, Kansas, Home Accommodates from 2 to 5 Bedrooms Within Its Trim Lines

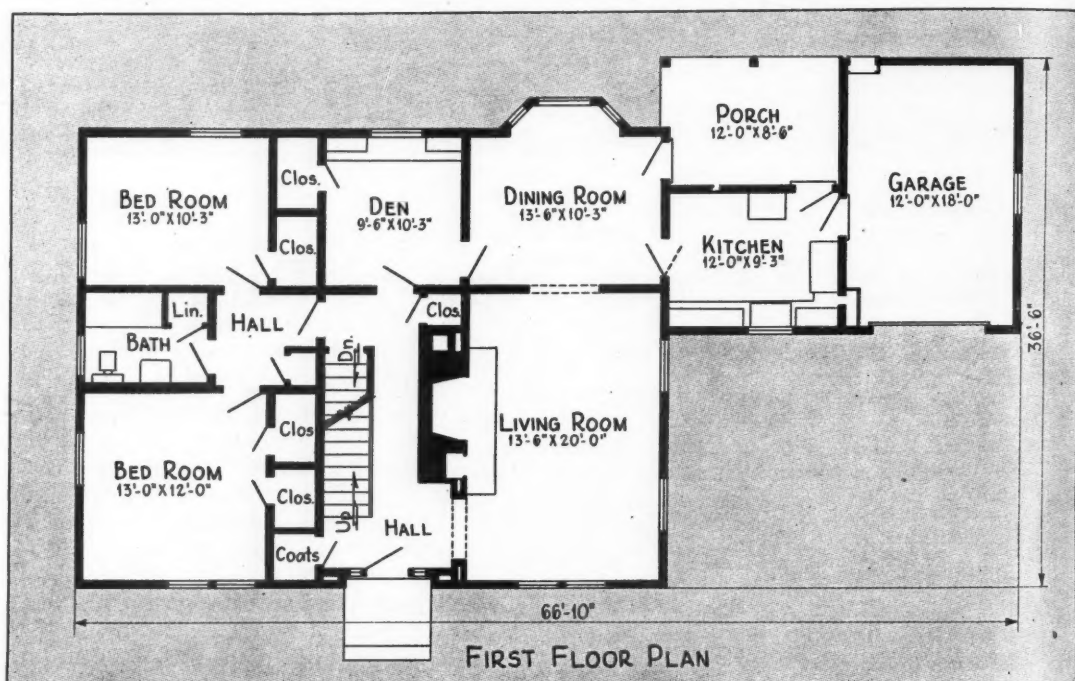
THIS home in Wichita, Kans., was designed by Architect B. G. Mains of that city. The architect had the problem of fitting the house to the owner's furniture and professional requirements, and at the same time kept close to the Cape Cod theme, making it authentic in many respects. Beyond this he has created a house that has decided livability and flexibility in that from two to five rooms can be used for sleeping quarters including the den and two upstairs bedrooms. Although the width limits placement on any but a wide city lot or country acreage, it would be adaptable to a corner or inside lot if turned lengthwise and garage redesigned so doors face street.

There are six rooms on the ground floor, all of which

are finished. The second floor, with the exception of the sub-floor and rear dormer windows, was left to be finished later. All heating ducts and plumbing equipment leading to the second floor line were put in to save cost later when completed. The recreation room in the basement was also left unfinished.

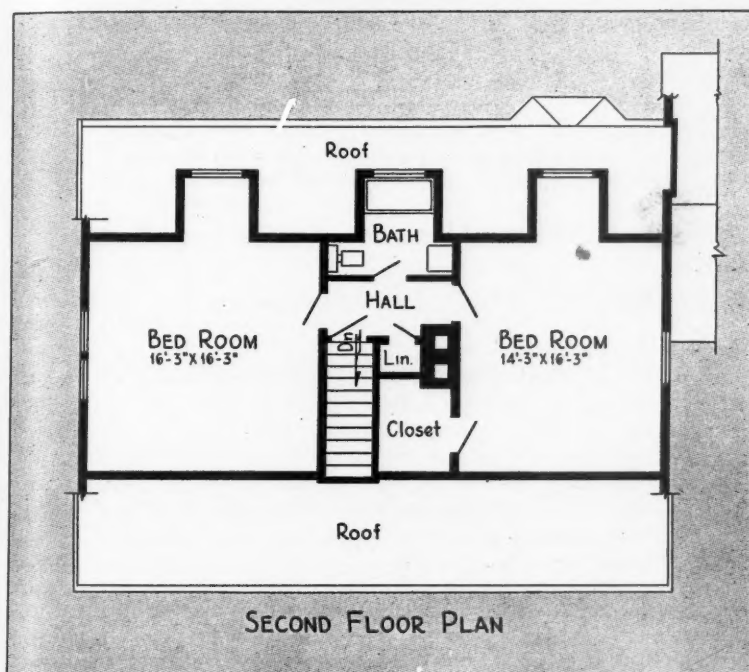
The entrance hall leads back to the bedroom hall and door to the library-den. Knotty pine paneling has been used in the den which the owner, an attorney, uses for his law office. A door from this room opens into the dining room, and from here there is direct access to living room, kitchen or the screened-in dining porch. An attached garage is next to the kitchen.

THE well arranged floor plan of the Cape Cod design below indicates exceptionally fine closet and storage space throughout. A built-in can receiver and a grocery receiver are extra equipment in the garage.





SIMPLE mantel in Wichita home features tile at fire opening and on hearth.



SECOND floor was designed by Architect B. G. Mains of Wichita, Kans., to accommodate two large bedrooms and bath to be finished later.



KNOTTY pine paneling and built-in bookcases are shown as built in the den of this Cape Cod home. Notice the storage cupboards over window.

OUTLINE SPECIFICATIONS FOR WICHITA CAPE COD HOUSE

Foundation: Poured concrete, asphalt waterproofing, vertical and horizontal $\frac{5}{8}$ " steel reinforcing bars, termite shield.

Basement: Unfinished; wood-burning fireplace unfinished, Andersen wood basement sash.

Exterior: Siding $\frac{3}{4}$ " x 10" red cedar; shingles No. 1, 18" stained two coats.

Framing: Joists 2 x 10, 16" o.c.; studding 2 x 4, 16" o.c.; ceiling joists 2 x 6, 16" o.c.; diagonal sheathing 1 x 12 covered with one thickness of Threaded Felt; sub-flooring 1 x 12, No. 2 covered with Red Rosin paper; roof sheathing 1 x 4, No. 2 spaced $2\frac{1}{2}$ " apart; roof rafters 2 x 4, 24" o.c.; all dimension lumber No. 1 white pine.

Windows: All frames Andersen white pine with metal weatherstrips.

Doors & Frames: All door frames white pine; all doors 6 panel Colonial white pine.

Flooring: All flooring $13/16$ " x $2\frac{1}{4}$ " random length select grade oak.

Trim: All interior trim white pine.

Bathroom: Standard plumbing fixtures; linoleum floors and Linowall wainscot; shower over tub.

Kitchen: Built-in cabinets with Standard plumbing and linoleum drain and splash boards and floor.

Library: Vertical knotty pine paneling with built-in bookcases and window seat.

Walls: All interior walls lath and plaster with exception of library wall.

Porches: Screened porch with flagstone floor in rear; front stoop flagstone.

Garage: One-car attached garage with Andersen upward-acting door.

Hardware: All McKinney hand forged thumb latch type with the exception of the bathroom and kitchen which is chromium finished brass.

Insulation: 4-inch mineral wool in the rafters and second floor ceiling joists.

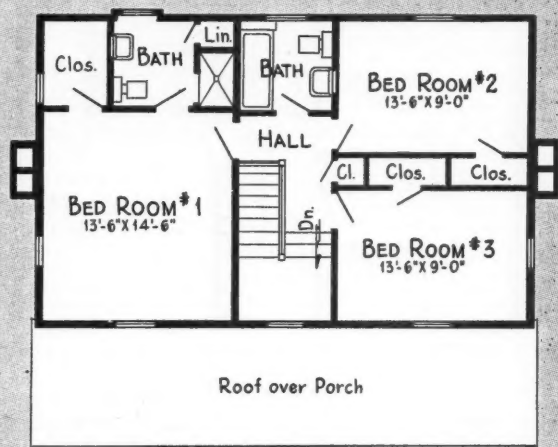
Plumbing: All fixtures Standard Sanitary Mfg. Co.; all water pipe $\frac{3}{4}$ " galv. steel; hot and cold water supply and floor drain in basement.

Wiring: All wiring BX cable.

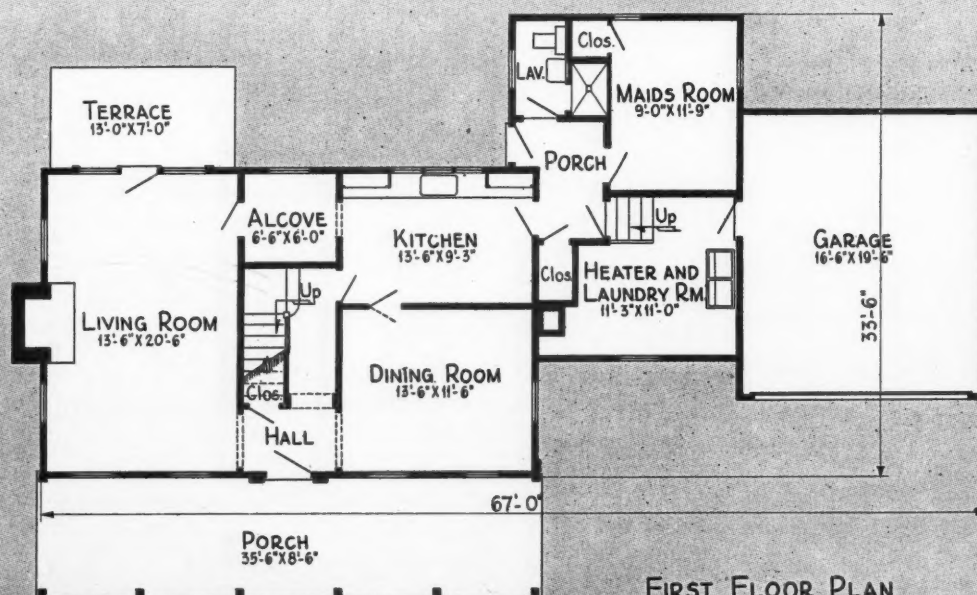
Heating: Gas-fired blower type heating plant with thermostat control; heat registers 6' 6" above floor.

Painting: Exterior three coats Pratt & Lambert outside white; interior four coats Pratt & Lambert "Cellutone" egg-shell white.





SECOND FLOOR PLAN



FIRST FLOOR PLAN

Home in Country

Built Without Basement at Oswego Lake, Ore.

CONVENTIONAL basement has been omitted in this clean-cut early American Colonial house, designed by Architect Richard Sundeleaf for a naturally wooded setting at Oswego Lake, near Portland, Ore., and built by the Lake Oswego Construction Company. Construction features are as follows: Foundation and footings, concrete; exterior walls, frame with beveled cedar siding, flush beaded boarding on front porch; common brick rear terrace and front porch; interior walls, wallpaper over putt finish plaster on Fir-Tex insulation, painted woodwork; floors, white oak; colored tile in bathrooms; heating, Wayne oil burner with forced air system.

AMERICAN BUILDER
The Cost FIGURES
FOR THIS HOUSE
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FIRST floor contains two wings, the main one having a central hall separating living room and dining room, and kitchen with breakfast room in rear. In the service wing are heating and laundry room, built at a 4-foot lower level than maid's room and bath with separate outside entrance, and the two-car attached garage.

A FEATURE of this Chicago home is its unique heating plant. The forced hot water system is built around a Capitol hand-fired, coal-burning boiler equipped with a Bell & Gossett booster pump and draft fan attachment. Thermostatically controlled, this combination offers many of the advantages of automatic heating. Radiators are the Young concealed type with an air circulating fan built into each unit and operated by the forced water flow. The system furnishes year 'round domestic hot water supply at low cost and the constant fire also can be used to burn household rubbish.

AMERICAN BUILDER
The Cost FIGURES
FOR THIS HOUSE
ON PAGE

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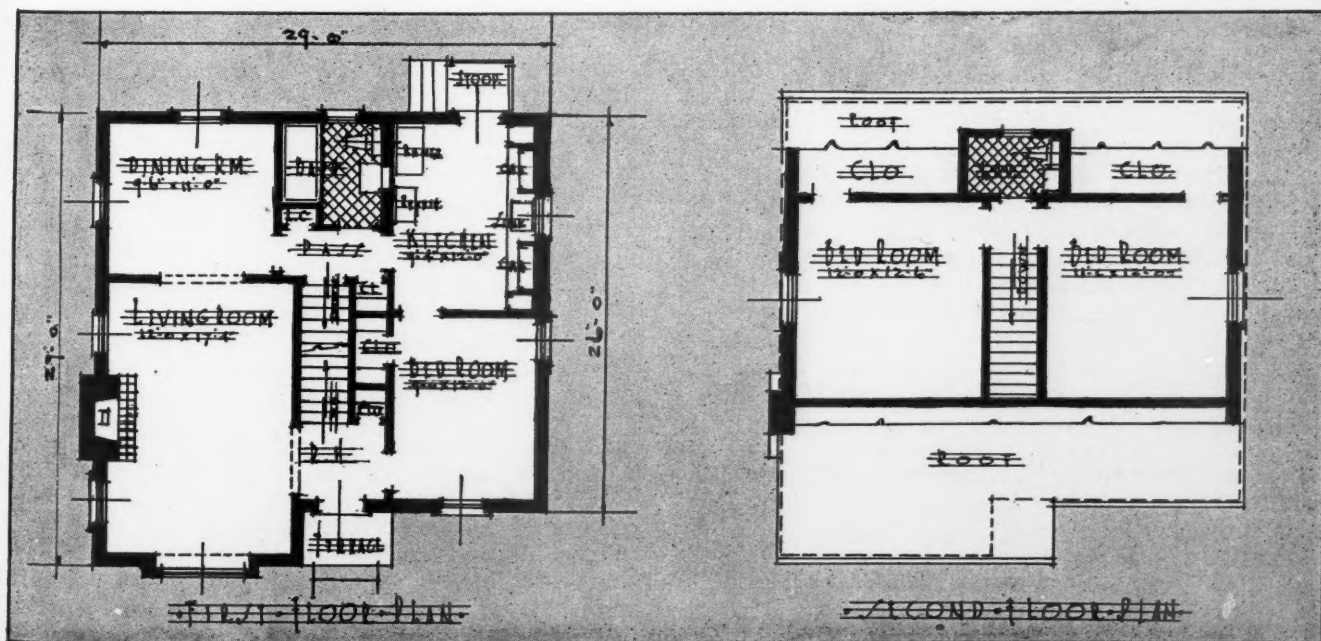
Well Planned 6-Room Colonial for City Lot

Designed and Built by McCabe Construction Co. Located in Chicago

COMPACT enough to be placed on a lot as narrow as 40 feet, this 6-room house offers livability far beyond its apparent size. An additional advantage of the plan is the possibility of leaving the second floor either partly or entirely unfinished if one bedroom is sufficient for immediate needs. The first floor has four handy closets, additional built-in kitchen cabinet space and good circulation throughout.

The exterior finish is select common brick with asphalt

shake shingles on the roof. Windows have double-hung wood sash; a large muntined window assures plenty of light in the living room and other first floor rooms receive unobstructed light from front or rear. Gutters and downspouts are of Armco sheet metal. Interior wall finish consists of 3-coat plaster on U.S.G. Rocklath furred over the solid brick walls. Mineral wool insulation is used over ceilings. Floors are dark stained red oak except Armstrong linoleum in kitchen and ceramic tile in bath.



ProCost

Figures for American Builder Homes

HOME DESIGNS ON PAGES AS NUMBERED

Unit of Construction

	Dec. 36	Dec. 37	Dec. 38	Dec. 40	Dec. 41
Basement Walls, lin. ft.	110	140	150	166	136
Trench Walls, lin. ft.	45	60	96	110	0
Basement Floor, sq. ft.	756	1024	1323	1183	796
Garage Floor, sq. ft.	0	350	247	350	0
Excavation per ft. deep, cu. yds.	35	48	61	59	34
HoltRate on following items	1.870	2.307	2.195	2.275	1.313
Outside Walls, squares	24.4	22.2	26.4	20.1	18.2
First Floor, squares	8.7	10.2	14.6	11.8	8.0
Second Floor, with Fin. Flg., sqs.	7.0	13.7	6.9	8.1	4.6
Second Floor, without Fin. Flg., sqs.	0	0	6.4	0	3.4
Ceiling, sqs.	8.7	13.7	17.1	15.3	7.6
Roof Pitch, inches rise per ft. run	10"	5"	10"	10"	12"
Roof, squares	12.1	22.5	23.6	21.2	12.4
Hips and Valleys, lin. ft.	30	170	40	48	16
Cornice, type and lin. ft.	C & F-165	12"-180	C & F-248	C & F-313	C & F-182
Cornice, type and lin. ft.	0	C & F-96	0	0	0
Partition, lin. ft.	222	290	240	254	166
Inside Finish OS Walls, lin. ft.	234	334	310	322	176
Front and OS French Doors, opgs.	3	4	2	2	1
Rear and Grade Doors, opgs.	2	2	1	1	1
Garage Doors 8' wide.	0	2	1	2	0
Inside Doors and Cased Opgs., opgs.	21	25	23	23	17
Windows and Casements, opgs.	27	22	25	27	12
Gable Sash and Louvers, opgs.	2	0	0	0	0
Chimney, lin. ft.	38	38	34	34	33
Main Stairs	2	1	1	1	1
Porch Floor, sqs.	1.1	1.2	1.0	2.8	0
Porch Ceiling, sqs.	1.1	1.2	1.0	2.8	0
Porch Beam, lin. ft.	42	26	17	51	10
Porch and Balcony Post and Newels, No.	18	8	2	7	0
Porch Roof, sqs.	1.4	(a)	(a)	3.6	0
Porch Cornice, lin. ft.	38	(a)	(a)	20	0
Porch and Deck Rail, lin. ft.	30	25	0	0	0

(a)—Included with main roof and cornice.

Necessary Home Equipment, Fixtures, Accessories, Extras

Since the above surveyed items cover only the actual superstructure of the house, you should figure and add the following items as specified or wanted (and don't forget Overhead and Profit):

Areaways, Cellar Sash, Coal Chute, Basement Partitions & Doors, Attic Flooring, Attic Stairs, Blinds, Gutters & Downspouts, Fireplaces,

Built-in Cabinets, Rail & Newels for Stairs and Stair Well, Beamed Ceiling, Weatherstrips, Tile Work, Plumbing, Heating & Air Conditioning, Lighting, Terraces, Patio Walls or Fences, Sidewalks including Porch Steps, Driveways, Unattached Garages. Also add for painting and decorating if not included in Unit Costs.

How to Build Low-Cost Plank Walls and Floors

(Continued from page 35)

Increased Insulation

The plank floor was 24.8 per cent more efficient than the joisted floor from the insulation standpoint. Among the advantages of the plank type structural floor over the joisted floor with its sub- and finish flooring of one-inch lumber is increased insulation secured without any additional cost.

The conventional joist, placed on edge, requires about 1 to 1½ board feet of lumber per square foot of floor area, and all the lumber does is to support load and possibly serve as a nailing base for lath if the ceiling is plastered. Adding this board foot to the thickness of the sub-floor makes it do double duty. It supports the load, functions as additional insulation, and does not increase the amount of lumber required.

Insulation qualities were of significance because the house was built without a basement. Under such circumstances an ordinary floor may need additional insulation properties and logically the cost of the insulation material and labor to place it, in order to make the joisted floor equivalent to the plank floor, should be added to the cost of the joisted floor. This will greatly

increase the already marked cost advantage of the plank floor. In fact, it would make the joisted floor cost about 65 per cent more per square foot than the plank floor.

Adaptability

The plank floor, in this instance used only in the first floor of the house, can be used for the second floor by simply carrying the posts up one more story. If a rustic or provincial effect in the ceiling from the exposed planking is not satisfactory and some other effect is desired a higher grade of planking, such as a V'd edge joint, may be purchased. The plank themselves afford an excellent nailing base for the affixing of paneled or plywood ceilings.

A quite usual practice is to lay flooring strips between the sub- and finish floor. When this is done it is simple to provide adequate space for electric conduit and the like at the second floor level. If it is necessary to plaster the ceiling furring strips are in order on the under surface of the plank floor and around the beams, but their application is quickly accomplished and the margin will still be well in favor of the plank floor.

Careful thought at the drafting board, in the preparation of the plans and in minor adjustment of room sizes, will readily indicate that this method of construction offers very little in the way of complications in applying it to the average small home.—R. G. Kimbell.

1938.

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PLYWOOD PROGRESS

**1938 Report of
Douglas Fir Plywood
Performance & Utility
in Present-day Building**

NEW STANDARDS FOR PLYWOOD INDUSTRY

By **PHILIP GARLAND**

President, Douglas Fir Plywood Assn.

TWO technological developments of outstanding importance have marked the progress of the Douglas fir plywood industry during 1938.

First was the adoption of a definite standard for the minimum moisture resistance of all Douglas fir plywood.

Second was the launching of a grade-marking and trade-marking policy by the Douglas Fir Plywood Association.

These two improvements of immeasurable benefit to builders and the consuming public, became effective officially November 10, 1938.

On that same date was promulgated also the revised U. S. Commercial Standard (CS45-38) for Douglas fir plywood. This standard, proposed by the industry and established by the National Bureau of Standards, incorporated officially the rigid moisture resistance requirements for both the water-resistant stock panels and those of the strictly waterproof type; in addition were included details of the Association's grade-marking program.

Moisture resistance in plywood has been of interest for many years, especially since the world war when highly water-resistant glues were developed for army airplane construction.

During recent years, Douglas fir plywood has bounded

into the limelight as a versatile, first-class construction material. Immediately, moisture-resistance became of greater importance, and it became obvious that definite performance standards should replace the more general, yet strictly factual description of the bonding agents used in manufacture.

A little more than two years ago, engineers from the FHA and other government agencies met with technicians from the U. S. Forest Products Laboratory and the plywood industry to solve this problem. The endeavor was to establish tests or performance standards which would be clearly indicative of the suitability of plywood panels, for both permanent exterior exposure and casual exposure such as might be encountered during the sheathing of a building.

The Committee, with a Bureau of Standards representative as chairman, arranged for numerous tests, and, after painstaking investigations, determined upon certain definite moisture-resistance requirements. A consideration of plywood sheathing and sub-flooring under actual job conditions was the guide and basis. The industry, recognizing the multitude of uses for its product, felt that not only its sheathing grade, but *all* Douglas fir plywood could and should conform to the new standards and accordingly these were included as already noted in the government's Revised U. S. Commercial Standard CS45-38.

The next step was to give the consumer visual assurance that when he purchased Douglas fir plywood, in one panel or a carload, he was getting material of the exact type, grade and specification ordered. Controlled grade-marking was the obvious solution, and so without delay a program was set up by the Association.

Appropriate symbols for each grade were designed, registered and trade-marked. These symbols, sometimes called the Four Aces by our associates, and the Four Horsemen by our competitors, are illustrated in Fig. 1. The mark "Ext-DFPA" is used only on the "exterior" type of Douglas fir plywood made with a strictly waterproof bonding agent and suitable for permanent exposure to weather and moisture. It will be noted that each mark or symbol contains the initials DFPA, the official abbreviation for the Douglas Fir Plywood Association, as well as the grade designation.

For the special benefit of carload industrial buyers, whose orders may be for various cut-up sizes there is issued a certificate of inspection showing material to be as ordered.

Mills that are Association members are licensed to use



THIS CIRCULAR stamp in the corner of a panel denotes Plyscord sheathing. The "M. Res." stands for moisture resistance as per U.S.C.S. 45-38. On the face of the Plyscord panels the word "PLYSCORD" is also repeated in parallel lines 16" apart.



THIS SQUARE shaped stamp appears on the back of all PLYWALL wall board of Douglas Fir Plywood.



THIS DIAMOND-SHAPED stamp appears on the face of all genuine Concrete Form Panels, made with special highly water-resistant glues.



THIS is stamped or branded on the edge of all standard panels, i.e., G2S; G1S; and So2S.



THIS MARK is branded or stamped on the edge of all Exterior Plywood Panels and denotes that they are strictly waterproof, capable of passing severe requirements of U.S.C.S. 45-38.

FIG. 1

these grade-marks and the Association trademark, providing they adhere strictly to the U. S. CS45-38, and Association grading rules. The specialized inspection service of the Association, with a corps of experts, co-operates with the mills in enforcing adherence to rules, closely supervises all grade-marking and trademarking and assists in their constant endeavor to improve and perfect the technique of plywood manufacture.

Benefits to Consumers:

The consumer by specifying material of desired type and grade, "stamped or branded with the official grade-mark and trademark of the Douglas Fir Plywood Association," is assured of plywood conforming to U. S. Commercial Standard CS45-38. Also he knows the plywood will have definite water-resistance and be suitable for the recommended uses.

Details of New Grades:

Members of the Association manufacture Douglas fir plywood of three performance types.

The highest of these is "Exterior" plywood which is edge-branded or stamped "EXT-DFPA." It is intended for permanent outside exposure, and is made in several appearance grades such as Good 2 Sides, Sound 2 Sides, etc., to provide for a variety of services. Only plywood made with glues tested and approved by the Research Department of the Association can be given the "EXT-DFPA" marking.

Next is the special Concrete Form grade, in which every panel is face-stamped "PLYFORM." This type has a special highly water-resistant glue bond suitable for a number of re-uses in concrete forms, trench sheeting and similar temporary construction uses. The grade-mark "PLYFORM" within a diagonal stamp protects the consumer from getting Sound 2 Sides stock panels "at a lower price." The number of re-uses obtained with "PLYFORM" will vary. Numerous authentic records show 15 and more re-uses on different jobs.

The "Moisture-resistant" or third type of Douglas

fir plywood embraces the familiar stock panels, made in six regular grades. Of these the three top appearance grades (Good 2 Sides, Good 1 Side, and Sound 2 Sides) are all edge-branded or stamped "PLYPANEL-DFPA." A "good" side or face must be in one sheet of practically clear veneer, whereas a "sound" face may consist of several longitudinal pieces and may contain neat patches, sap and minor streaks but is free from any open defect, and is suitable for a paint finish. It has been found impractical to attempt to distinguish between these grades by marking for several reasons. For example, a Good 2 Sides panel might be marred on one face in transit and have to be sold as "Good 1 Side"; obviously a "Good 2 Sides" grade mark, in such event, would mislead.

"Wallboard" and "Sheathing" are the other two stock grades of interest to architects; the "industrial" grade is used almost exclusively for cut-up stock in toys, furniture, automobiles and the like.

Wallboard is now stamped "PLYWALL" on the back. In the standard 48" width, it is probably the most familiar and popular of all plywood grades.

"PLYSCORD" the new unsanded Sheathing grade of Douglas fir plywood, bids fair to revolutionize light building construction. Every panel is marked in parallel lines 16" apart across the face, for ease in nailing, and is stamped "PLYSCORD" within a circle. The exposed face is patched to eliminate all open defects larger than $\frac{3}{8}$ ".

Under the new requirements every piece of Plyscord Sheathing (as well as "Plywall" and "Plypanel") must possess adequate moisture resistance for building uses and be capable of passing the severe tests specified in U. S. Commercial Standard CS45-38.

The establishing of these new standards for Douglas fir plywood has improved the product of the entire industry, and has made it possible for architects and builders to specify with assurance as to quality and serviceableness. Moisture-resistance standards, grade-marking and trade-marking, backed by Association supervision, pre-sage a new era for one of America's lustiest infants. "There is a suitable type and grade of Douglas fir plywood for every service."

Dri-Bilt with Plywood

THE Forest Products Laboratory, of the U. S. Department of Agriculture, states:*

"During the plastering operation in a moderate-sized, six-room house, approximately 1,000 gallons of water are used, all of which must be evaporated before the house is ready for the interior finish."

The elimination of this veritable flood of water has been the goal of housing research authorities and is the purpose of "Dri-bilt" construction, towards which there is a definite trend in modern housing.

"Dri-bilt" construction utilizes large 4' x 8' panels of Douglas fir plywood for sheathing, sub-floors, and interior wall and ceiling coverings over the time-tested lumber-framed structure with standard 16" spacing of joists, studs and rafters.

Parenthetically, and for the benefit of readers who have not read the "Handbook of Douglas Fir Plywood" in the *American Builder* one year ago, it may be stated here that Douglas fir plywood, 5/16" thick for wall sheathing; 5/16" or $\frac{3}{8}$ " for roof sheathing; $\frac{1}{2}$ " and $\frac{5}{8}$ " for sub-floors, $\frac{1}{4}$ " for interior wall surfacing and $\frac{3}{8}$ " or thicker for exterior wall covering, are definitely accepted and approved by building authorities.

*"Wood Handbook," page 208.

Plyscord sheathing is manufactured in two sizes, 48" x 96" and 32" x 96" with the former size greatly predominating in popularity. The wallboard grade (Plywall) comes in a single standard width of 48 inches; and in even foot lengths from 5 to 8 feet.

These widths and the commonly used 96" lengths are all multiples of 16 inches, which in turn is the standard spacing for joists, studs, and rafters. Consequently, if the dimensions of a floor plan conform to these panel sizes, plywood panels 4' wide can be used with a maximum efficiency. That is the basic principle of any so-called modular system of construction.

With Douglas fir plywood, a 4-foot module or grid—and 16" and 32" divisions where necessary—will minimize cutting and fitting, reduce certain framing costs, and improve the symmetry of interior panels and trim. Let us see how easy this really is.

Plywood Saves Cutting and Fitting

If the overall dimensions of the house frame are some even multiple of 4', such as 24' or 28', obviously Plyscord Sheathing panels 4' x 8' will cover the surface, with no waste and no fitting or cutting except at openings.

Similarly the sub-flooring, will consist of a definite number of 4' x 8' panels. In a house 24' x 32', only 24 panels would need to be laid to cover the entire sub-flooring, with no sawing and no fitting; the result is a perfect working platform, ideal for laying out partitions and walls, and free from accident hazards.

Furthermore, if window and door openings can be planned to fall between the 4 foot grid lines (actually merely guide lines for efficient layout) then only one panel need be cut for each opening. This is true also of openings in subfloors for stair wells.

If a floor plan must contain jogs and offsets, the resultant extra cost can be minimized by planning the walls to come at grid lines, thus once more capitalizing on the large 4' x 8' plywood sheathing and wallboard panels. This is especially important for dimensions measured across the joists.

If plywood is used only for interior walls and ceilings, then the first stud from the corner post should be centered 16 inches from the face of the finished wall running at 90°. The third stud will then be 48" away so that one edge of a 48" plywood panel will come at the center of that stud, while the other edge will be snug against face of the adjacent wallboard.

Partitions parallel to joists require a double joist to support them. If the partition is placed over an existing joist, only one extra support is needed.

If the face of a partition is an even four foot multiple from the opposite wall, then 4' panels will fit over the two adjacent walls without having to cut or fit the two adjacent panels.

This also applies to the ceiling.

It is evident that every room cannot be dimensioned to fit grid lines, but some rooms—usually about half—can be and this permits a substantial savings.

If all openings occur between grid lines, i.e., within four foot panels, headers will be all the same length



FIG. 3. Studio type living in a Dri-Bilt house recently completed at Albany, Ore. Wall covering of all rooms was Douglas Fir Plywood. The living room finish was simply a clear lacquer and wax. Two bedrooms were given a light stain and the kitchen and dinette a flat enamel finish.

throughout the house, allowing quick, economical cutting.

The use of full-size 4' x 8' Plywall panels, and the centering of openings within a panel make possible a more symmetrical wall pattern, for joints will automatically be spaced evenly from trim and corners.

In the detail shown, Fig. 2, the outside joist in the box sill is set 5/16" outside beyond the exterior face of the studs. This averts the necessity of continuing the sheathing over the sill and simplifies the use of standard 4' x 8' Plyscord sheathing, either horizontally or vertically.

Simple corner details for nailing the Plywall interior panels are also shown.

Dri-bilt houses with Douglas fir plywood follow standard framing plans and methods, with minor modifications that simplify and reduce costs.

The suitability of 5/16" Plywall, the wallboard grade, has been known for years, and has been enhanced by the attractive new stains and finishes described elsewhere.

The structural superiority of 5/16" plywood has been demonstrated at the U. S. Forest Products Laboratory, as well as Stanford University, and on many structures.

The adequacy of 5/16" Plyscord as a shingle base has been proved and attested by Professor Bror Grondal, at the University of Washington, and probably the foremost shingle authority in the world.

Any house plan big or little, for mansion or cottage, can be used for a "Dri-bilt with plywood" house. Already the National Plan Service, Chicago, Ill., has prepared complete working drawings with details of plywood for sub-floors, sheathing and interior wall coverings. These plans are available through retail lumber dealers.

Housing experts and research engineers have sought for years the answer to the low-cost housing question. In the Dri-bilt house, the Douglas fir plywood industry offers a practical, economical solution.

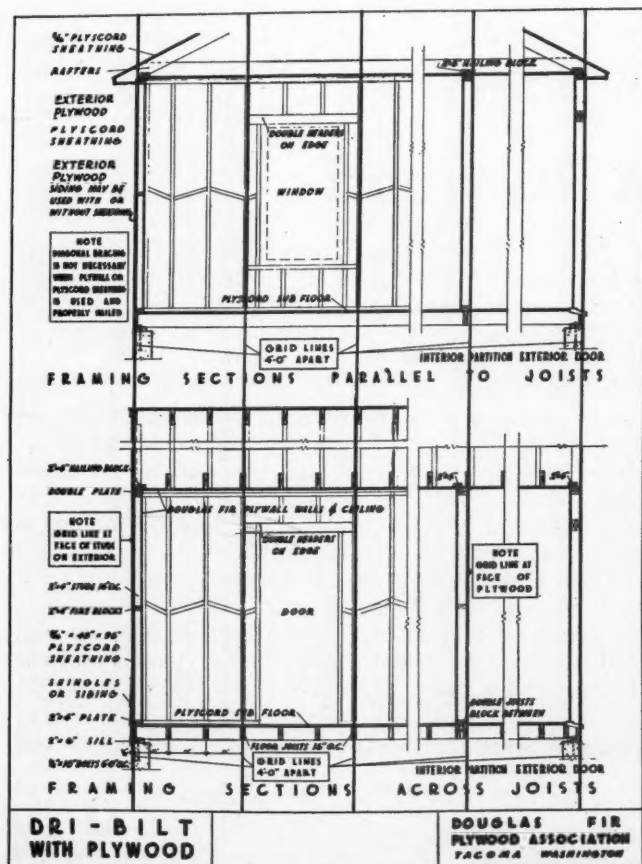


FIG. 2. Scheme for Dri-Bilt house construction.

New Methods of Finishing Plywood

NOT so many short years ago the staining practices used in connection with Douglas fir plywood were apparently limited to red brown stain covered with a gloss varnish.

Fortunately this mishandling of a fine material has given way to a keener appreciation of the inherent possibilities of plywood, and from this understanding methods and materials have been so developed, that now the attractive finishes which may be obtained on Douglas fir plywood are unlimited.

Color in all its values; painted surfaces; finishes which control and soften the grain pattern; and finishes which bring out the vivid strength and handsome vigor of this pattern—are all available. In the hands of qualified craftsmen who use materials of proper quality, effects appropriate to rooms of any style or usage may be produced.

The finishing of Douglas fir plywood may be considered in two groups: stained surfaces and painted surfaces. These are subdivided between the interior and exterior.

For either painted or stained surfaces it is possible to control the grain conditions existing in Douglas fir. The spring growth is a soft light-colored wood; the summer wood is hard and comparatively non-absorbent. Douglas fir plywood treated at the mill with a clear resin sealer may be obtained. It has been found that this sealer protects the wood, serves as an excellent base for any stained, painted or papered finish, and balances the differences in the fir grain.

A sealer, of course, may be applied at the job, but when this coating is put on following the sanding at the mill, grain raising due to atmospheric moisture is minimized. This is of obvious advantage because hand sanding at the job to restore perfect smoothness is a tedious operation. It may be noted also, that the application of this sealer as a mill procedure, costs less than when put on at the work.

Natural and Stained Finishes on the Interior

For a natural finish, the wood may be given a resin base sealer, sanded carefully, then given two coats of paste wax applied with a rag and well rubbed. With this type of finish, great beauty may be obtained by a careful selection of grain pattern. In making such selections a good general rule to remember is that the closer the graining the better the paint job. Therefore when going through the plywood delivered for a Dri-Built house selections by room can be made, dependent upon the final finish.

Flat or gloss interior varnish applied over sealer may be put on for a natural finish but this tends to heighten the red orange cast of the wood, and gives a hard brittle surface.

The waxed surface has several advantages and one disadvantage. Wax is a solvent and to remove finger marks or to clean a waxed finish, all that is necessary is to rub on a little more of the same material. The disadvantage lies in the fact that if it is ever desired to paint over such a finish, all of the wax must first be removed with gasoline or other comparable material.

With stains, color control is the most important factor. If a white stain using any good white paste in a vehicle of $\frac{1}{2}$ turpentine and $\frac{1}{2}$ boiled linseed oil is to be put on, it is applied directly over the resin sealer or to the raw wood. This white stain is then fixed with shellac. The thin white coating maintains the original pattern of the wood, that is, the darker wood remains darker and the soft wood has the lighter appearance. More important is the fact that the red in the wood is subdued so that colors of light value may be used and are not "greyed" by the red cast.

After the white stain is shellaced, the panel is sanded. Almost any type of stain may then be used, and finished with lacquer, varnish or wax.

An especially handsome finish is obtained by giving a coat of white stain, as outlined; one coat each of shellac and clear lacquer, both carefully sanded, and a paste wax glaze rubbed on, the wax being pigmented as desired with color ground in oil.

In many designs the full pattern of the wood is desired and ingenious methods have been developed to use this pattern appropriately. Lloyd Wright, architect, of Los Angeles has installations in which he washes the wood with a solution of caustic soda in water. This greys the surface and raises the grain. Over this he applies a pigmented stain. This gives a soft bloom to the surface. Then, in a preconsidered design arrangement, he waxes certain portions so that subtle differences of color and surface are obtained. The effect is delightful.

Sand blasting and wire brushing are both used, and one company is producing Douglas fir panels which have been darkened under a gas flame and then have had the soft charred portion brushed out with rotating wire brushes. A pigmented glaze is wiped into the lower surfaces giving a colorful and decorative effect. Examples of this finish may be seen in many store show windows.

Painted Interiors

If the one-piece effect of plaster is desired, the best results may be obtained by giving a heavy stipple to the last coat. This applies especially to enamelled surfaces.



FIG. 4. This shows a full bodied light colored stain with the half round battens in contrasting color. The surface was given a thin coat of shellac, and two coats of pigmented oil stain. It is a light grey-green. The shellac and first coat were carefully sanded and the final coat was rubbed after drying to a smooth practical surface.



FIG. 5. Here a "Vee" joint is used to good advantage. This illustrates one of the most practical methods of paneling plywood. Architect, W. F. Ruck.

Further, the joints must be carefully made to prevent any movement which may break the paint film.

The structure may be furred with $\frac{1}{4}$ inch plywood strips and the Plywall glued thereto.

Stippled surfaces may be obtained using a resin sealer or a coat of shellac after which a thinned prime coat is applied. For the final coat a heavy coat is put on without thinning. This paint should be stirred thoroughly because the heavy paint mixture settles. This coat should not be brushed out but spread on with a large wall brush. A stipple brush or a large sponge cut to a flat surface is used to develop the stippled effect.

Enamel coats may be applied heavily and stippled in the same manner.

For plastic and water paints the surface must be sealed to prevent grain raise. Otherwise, the only precaution necessary is that they be applied in accordance with the manufacturer's directions.

Exterior Finishing

Where the new "Exterior" plywood is used the painting methods found most effective in the community where the work is being done should be followed. "Exterior" plywood has two advantages in so far as painting is concerned. It has been found that the "bark" face of wood weathers better than the "heart" face. All Douglas fir plywood has bark faces. Secondly, the hot plates used in the manufacture of "Exterior" plywood assure the user that the wood will be dry. If the plywood is sealed with a satisfactory sealer at the mill, the dryness is maintained, which guarantees a much better paint job than is possible on wood which is not dry.

Lead base paint has proven its capacity through hundreds of years usage, and details as to its application are known to every painter. In sections where relative

humidity is high, however, the lead may be reinforced to good advantage by the addition of zinc oxide which dries with a more brittle film than the lead. For Douglas fir, a priming coat of aluminum in a resin varnish vehicle has proven its moisture excluding effectiveness.

Prepared paints offered by reputable manufacturers are generally satisfactory but it should be remembered that in so far as paint maintenance is concerned, repainting should follow the formula of the paint which is already on the job to avoid the possibility of incompatibility.

In applying any wood siding, added protection is given to the wood by edge sealing with lead and oil or comparable material. This applies also when "Exterior" plywood is used.

A series of paints with resin vehicles are now available for exterior use. Experience with these indicates that if they are applied correctly that highly weather-resistant qualities result. Practically all of the "Exterior" plywood buildings including the Federal Building at the San Francisco Exposition of 1939 are painted with these paints. They come in all colors, dry rapidly, and have the soft, flat quality which is so desirable where lighting effects must be considered.

Proper Nails for Exterior Plywood

Nails should be mentioned. On the exterior hot dipped galvanized nails prevent corrosion and should be used. Casing nails may be used with "Exterior" plywood with the head driven flush with the wood. On the interior 4d or 6d casing nails are generally employed, the size being dependent upon the thickness of the Plywall used. If paper is to be placed over the Plywall, it is good insurance to use galvanized nails. The water in the paste sometimes rusts the top of the nails which will show through the paper.



FIG. 6. This illustrates a stained finish with "Snap-on" metal molding as designed by Architect W. F. Ruck for an office in the Bell Medical Building, Los Angeles, California.

Modernistic Effects with Panels

Modernistic effects are generally considered to be a combination of simple, colorful surfaces designed in such a manner that horizontal elements predominate the arrangement.

Plywood is distinctive in its capacity to adapt itself to any architectural effect. The sheets may be laid in continuous horizontal bands with the pattern strengthened by metal "snap ons," by Vee joints, or by small wooden mouldings.

A modern living room ready for the introduction of furniture and decorations of smartest vogue may be de-

scribed as follows:

Floor: Linoleum of mulberry red with cut in pattern of white and blue green.

Walls: Douglas fir Plywall laid in horizontal bands, approximately 24" high with $\frac{3}{4}$ " half-round moulds. The Plywall has been sealed, white stained, shellacked, given a light blue stain, lacquered and waxed. The moulds are enamelled in clear blue green.

Ceiling: Douglas Fir Plywall placed with tight joints, sealed and given a stippled finish coat of plastic paint in the natural off-white color of the material.

Would it not be fun to hunt up furnishings for a bright room like that?

Paneling with Plywood

NUMEROUS ingenious and extremely attractive paneling details are possible with Douglas fir plywood, whether in natural and stained finishes or painted.

The year 1938 has seen a growing tendency by architects and decorators to utilize the striking beauty of Douglas fir graining, by treatments which soften the grain contrast but still leave the pattern visible. This in turn has led to paneled details such as shown in illustrations, Figs. 5 and 6, from the Belt Medical Building in Los Angeles.

Mouldings may be applied to a smooth plywood wall to form almost any type of rectangular paneled effect.

A pleasing interior is easily obtained by nailing plywood strips, 4" to 6" wide, to the vertical studs, and then applying $\frac{3}{8}$ " Plywall grade to these strips, leaving a space about $1\frac{1}{2}$ " wide between panels. These "raised" panels, half-beveled along edges, were given a plastic finish that contrasted with the lighter colored paint used on the exposed portion of the strips.

Curves replacing sharp corners constitute another attractive innovation when executed skillfully as in Fig. 7. Note also the stepped ceiling paneling with thin strips along the panel edges to conceal them.

Superimposed plywood panels, cut out to meet architectural patterns, are often used over a smooth plywood wall. This is illustrated in Fig. 8, taken from a fine suburban residence built last year in Winnetka, Illinois. An unlimited scope is offered the architect and builder by this simple and economical method of obtaining decorative panel walls.

The school gymnasium and auditorium in Fig. 9 shows how square plywood panels, 48" x 48", can be artistically used for ceilings and walls of large structures, in combination with 4' x 8' vertical Douglas fir plywood as a wainscot. For a basketball court, plywood walls provide great strength and rigidity for the walls, yet a desirable resiliency between stud supports or furring strips so as to prevent bodily injury to the players. Further, the school principal reports, "Acoustics are perfect."



FIG. 7. Curved plywood walls and stepped ceiling paneling in modern house, Puyallup, Wash.

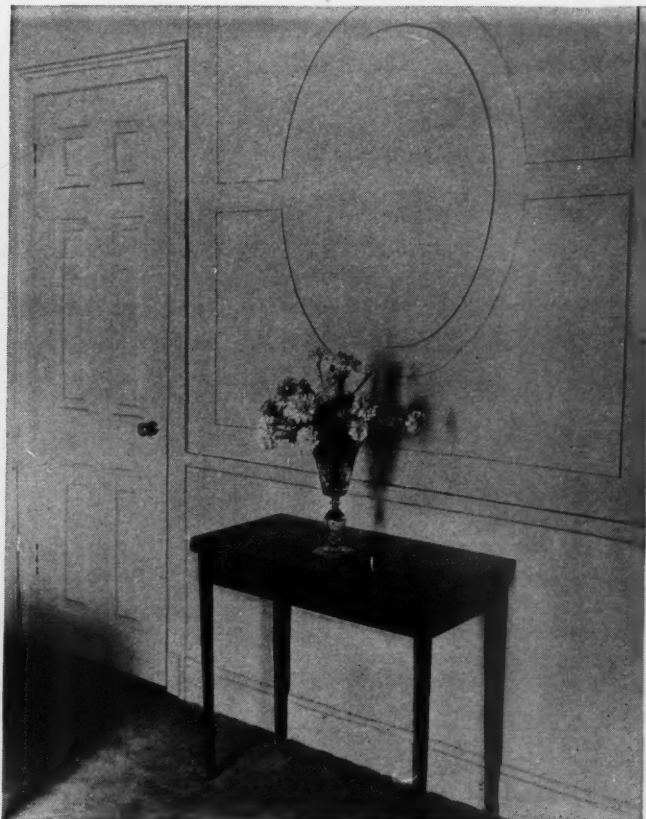


FIG. 8. $\frac{1}{4}$ in. plywood panels curved and cut on $\frac{3}{8}$ in. plywood; house in Winnetka, Ill., René P. Travellotti, architect.

Decorating Douglas Fir Plywood Walls

THROUGH the benefits of recent research, it is now possible to decorate Douglas fir plywood walls by a number of different and most satisfactory methods, including staining and also painting . . . that may, if desired, simulate a conventional plaster, stucco or concrete wall, exterior or interior.

STAINING: Stain is one of the oldest, best known and still most popular decorations for wood, common throughout the civilized world. Stains and the craftsman's technique of application have been too highly developed over the centuries and are too well known to need description. Recent developments by the Laucks' Laboratories, Seattle, Washington, of Rezite and Rez, synthetic resin sealers, have, however, made possible stain effects on Douglas fir and other softwood species having a wide variation in density of season growth heretofore possible only on hardwood surfaces of species with slight variation in density of season growth.

Laux Rezite, designed for factory application, and Rez, designed for application by the craftsman, are clear, synthetic resin sealers that penetrate and harden the soft grain of Douglas fir and like species of wood to a degree approximately equal in density to the hard grain thereby producing a hardwood-like uniformity of surface density of a character that takes stain comparable to hardwood. The sealed surfaces are also highly moisture resistant and equal to hardwood surfaces in resistance.

Stain effects on Douglas fir plywood, factory-Rezited, or sealed with Rez on the job by the craftsman, are now limited only by the knowledge and technique of painters and finishers. These synthetic resins seal the surface

fibres of the wood and make a perfect base to which paint will adhere, assuring better, more satisfactory and lasting, protective and decorative finishes.

PLYWOOD PAINTS: No less an achievement by Laucks' chemists was the development of "Plasterez" and "Rezitex," paste forms of synthetic, resin bound paints especially formulated to meet every functional and decorative requirement for finishing Douglas fir plywood for both interior and exterior exposure, and making possible one hundred percent "Dry Wall Construction."

"Plasterez" was specially formulated for interior use, is quick drying, contains a germicide, has no offensive or harmful odor, is highly waterproof, fire resistant, can be applied with either large brush or standard spray equipment, a wide range of textures and colors are obtainable and the film has the toughness, resiliency and resistance to abrasion and common wear essential to long and satisfactory service. "Plasterez" has also been found useful as a joint filler and a means of joining Douglas fir plywood panels, assuring a continuous flat surface in which joints are not visible when finished.

For exterior exposure over Rezite or Rez sealed plywood surfaces, "Rezitex" is unique. It combines in one product an extreme degree of resistance to fire, moisture, the destructive elements to which exterior finishes are exposed under varying climatic conditions and a complete range of texture possibilities, either by spray or large brush application.

It was this product that met the exacting demands of the San Francisco World's Fair architects with reference to appearance and durability for finishing their Douglas fir plywood-constructed buildings, as well as the demands of the contractors with reference to cost and ease of application.

Douglas fir plywood for exterior use and backed by the guarantee of west coast manufacturers, also these proved Laucks finishes, are now available through distributors throughout the principal market areas of the United States.

Wallpaper Over Plywood

MOST people like to have at least one or two rooms in their home finished with an attractive wallpaper. During the past few years, interior decorators have found that they can eliminate jagged cracks and other blemishes by using Douglas fir plywood as a base for the paper. Plywood provides a smooth base of unusual rigidity and free from the usual dangers of cracking or spalling off, even in regions subject to earthquake or settlement disturbances.

A well-standardized technique has been developed, using stock Douglas fir plywood, either deadening felt or "blank stock," and wall paper.

The plywood generally used is $\frac{1}{4}$ " or $\frac{3}{8}$ " Plywall, the familiar satiny smooth wallboard grade, in panels up to 48" x 96". Panels are butted carefully, with joints filled with Swedish putty, plastic wood or similar material which, after drying, should be lightly sandpapered.

The $\frac{3}{4}$ pound (wt. per sq. yd.) deadening felt, in either 20" or 36" widths, should be applied to the plywood with a wheat flour paste to which a gelatine glue size is usually added to increase its adhesiveness. Two coats of paste are needed, one on the plywood and one on the felt, or both coats may be used on the felt which is quite absorptive.

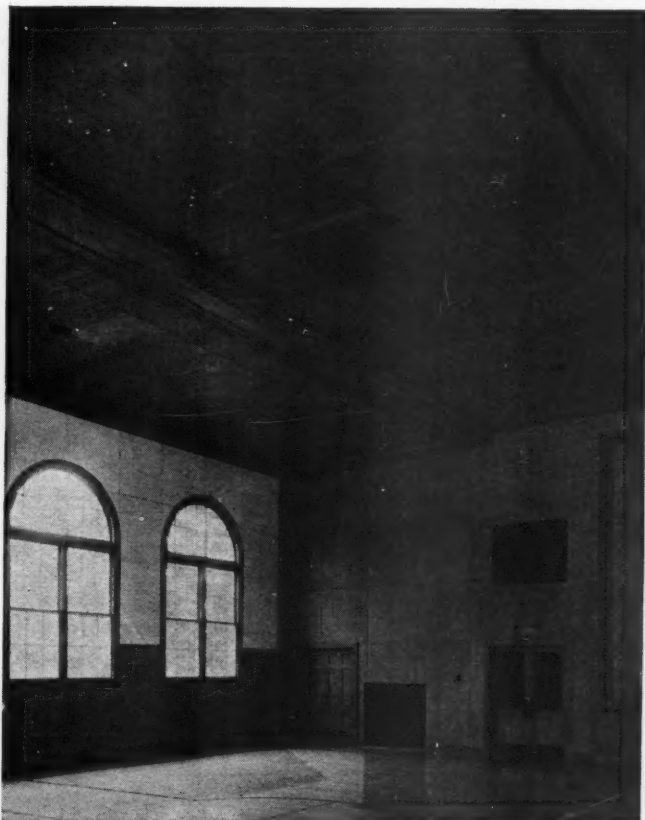
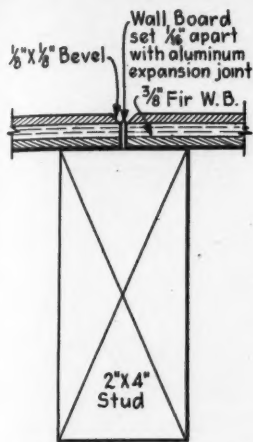


FIG. 9. Fir plywood paneling for walls and ceilings in large school gymnasium and auditorium. "Perfect acoustics," states the school principal.

American Builder, December 1938.



DETAIL OF FIR WALL
BOARD JOINT TREATMENT

FIG. 10. Douglas fir plywood wainscot walls are papered over plywood. Note joint detail; paper extends over V-groove to expansion joint strip but permits aluminum nosing to show and emphasize the joint line. Residence built in New Jersey in 1936.

Experienced paperhangers prefer the 36" width felt but the 20" is much easier to handle although it creates more vertical joints.

The felt is butted neatly at the joints, rolled and smoothed. The felt on the ceiling should extend about 1 inch down the sidewalls so that the strips applied to the sidewalls will lap over the ceiling strips about 1 inch. This lap will be covered by a moulding or border. Many decorators like to go over the felt with a smoothing brush to assure uniform adhesion to the plywood.

When the felt has been entirely installed the wallpaper is hung in accordance with standard practice, using the ordinary wheat flour paste.

A somewhat cheaper job may be obtained by omitting the layer of deadening material, but the felt is recommended because it serves to bridge over the joints between plywood panels. This is desirable since otherwise any slight movement in the lumber frame or in the plywood panels may reveal itself in the form of a minute crack, which might in turn crack the drum-tight wallpaper. The felt, or a muslin or sheeting grade of canvas averts this possibility, and, in addition, has the advantage of adding somewhat to the insulation and sound deadening properties of the wall.

"Blank stock," sometimes used over smooth plywood

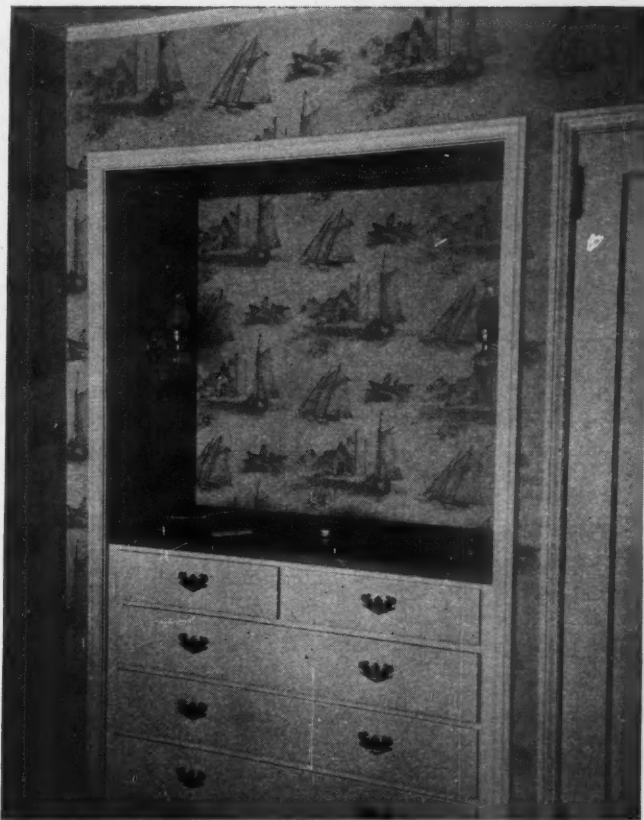


FIG. 11. Wall paper applied to a bedroom built-in. Plywood is now widely used by many builders for closets and built-ins because it is adaptable and workable and will not splinter or warp.

in lieu of the deadening felt, is unprinted wallpaper. An 18" width, 10-oz. grade is preferred. It may be applied horizontally across panel joints with the same procedure employed in hanging any wallpaper. The cost is usually less than for felt.

For modernization and repair jobs where old walls have become badly cracked, plywood can be installed by nailing it to the studs or wood frame and following the procedure described above.

Plywood "Accepted" by FHA

THE acceptance of any commodity by the Federal Housing Administration is indeed a commendation to be proud of. It is infinitely more than the implied approval when a product is purchased for use in a large Federal building. It signifies a long, careful observation of the product in question and a minute, detailed investigation of it through the Administration's own well staffed corps of technical engineers and through the finest technical aid which they can recruit from such agencies as the National Bureau of Standards and the U. S. Forest Products Laboratory.

FHA's chief concern is "good construction"—not for a month, until the house is sold, nor for three years, the period of a short term mortgage, but for periods up to 25 years, the period of their mortgage guarantee.

For the past several years, $\frac{1}{8}$ -inch "Plyscord" sheathing has enjoyed its place on the "accepted" list for sidewall and roof sheathing, while $\frac{5}{8}$ -inch material is O.K.d for subfloors, and $\frac{1}{4}$ " "Plywall" wallboard for interior walls and ceilings.

The latest recognition of the merits of the waterproof

resin bonded plywood designated as "Exterior" comes from FHA by its acceptance for outdoor application where it is completely exposed to the weather.

Its suitability for outdoor use has long since been recognized by many agencies and proven by tests at the U. S. Forest Products Laboratory, but the question of identification in the field presented a barrier to its general acceptance by FHA. This has been effectively overcome in the progressive stand which the industry has taken and the revised grade rules developed with the cooperation of FHA and the Forest Products Laboratory are now embraced in the Commercial Standard for Douglas Fir Plywood, established by the National Bureau of Standards. The Douglas Fir Plywood Association's rigid inspection service and labeling plan will assure every consumer of getting the proper material for any given use. "Ext.—D.F.P.A.," signifying exterior classification, will be used in connection with the grade designation which, together with the backing of the Association, will be the guide for all of the FHA inspectors and for the buying public.

SUGGESTED PLYWOOD JOINTS

SCALE 1/2 FULL SIZE

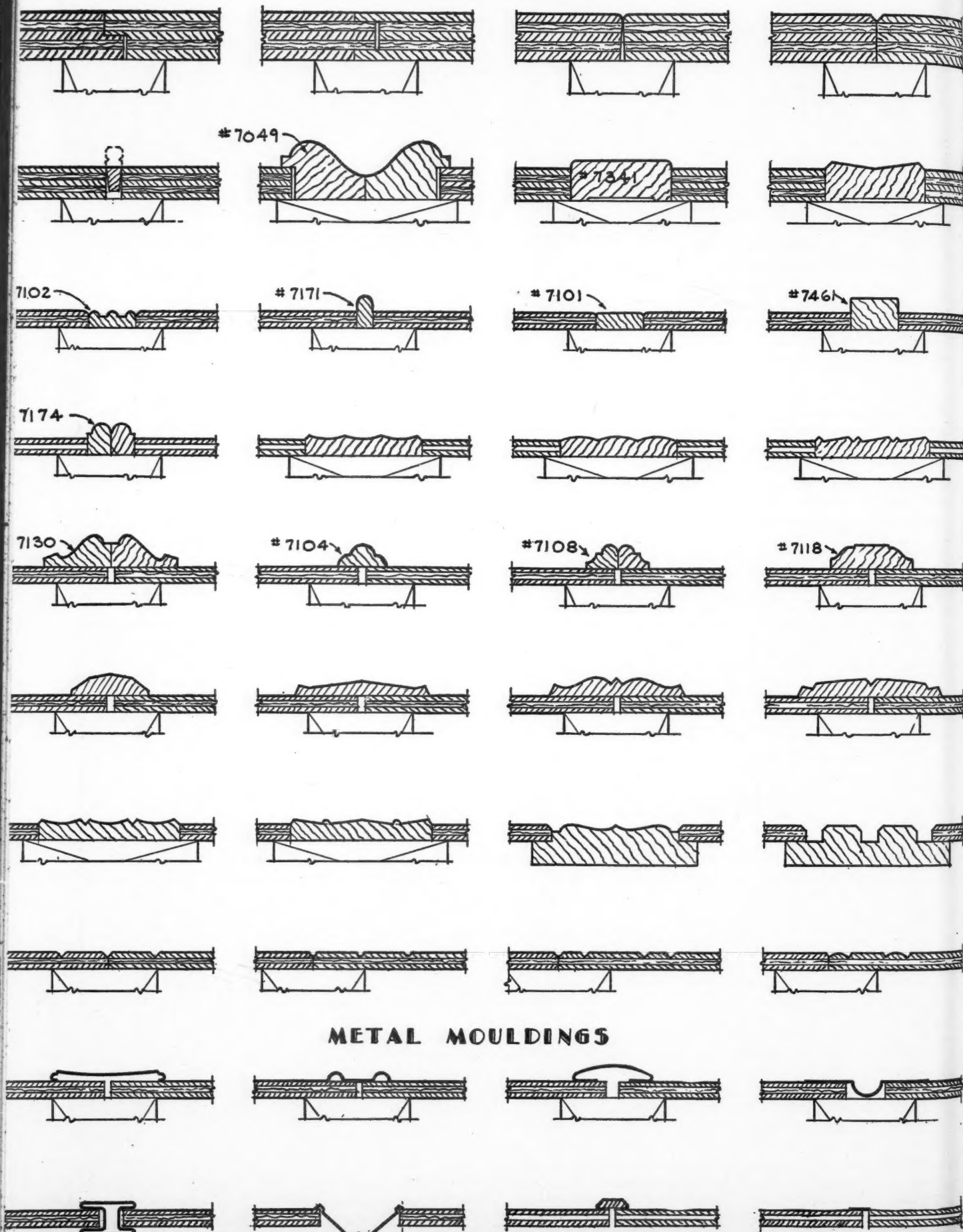


FIG. 12. How to handle joints in plywood walls, as recommended by Association engineers.

Plywood Progress at the Forest Products Laboratory

By F. J. CHAMPION,

Technical Writer, Forest Products Laboratory¹, Forest Service, U. S. Department of Agriculture

INVESTIGATIONS planned to give fundamental information on plywood properties and to adapt and modify plywood to meet the demands of modern usage are under way at the U. S. Forest Products Laboratory at Madison, Wisconsin. The studies include (1) determinations of the strength, rigidity, and lateral stability of plywood of different species and thicknesses and development of methods for calculating strength, (2) strength and moisture resistance of glues and gluing technic used in plywood production, (3) use of plywood in house construction, (4) thermal and moisture permeability and fire resistance of plywood walls and (5) treatment to reduce dimension changes in plywood and otherwise enhance the durability and utility of the material.

Although plywood is in the class of familiar materials there is still much to be learned about its rather complex strength properties—information that would be useful in extending the use of plywood or in avoiding pitfalls that may lie in the path of its rapid exploitation. From the standpoint of stress distribution under load, plywood embodies an already complex material, wood, and makes it even more complicated by redistributing it in thin layers with the grain of alternate plies at right angles. Add to this pattern the diversity possible through variation in thickness of individual laminations and the combination of different species, and the problem of strength calculations becomes intricate. Mathematical analysis of plywood brings into play a host of fundamental properties, many of which remain to be evaluated. Intensive studies are under way to clear up these matters and to check the mathematical principles involved by the results of a thorough testing program. Immediate work is concerned with the development of formulas for calculating the bending strength and stiffness, and with the development of a theory covering the behavior of plywood plates (large rectangular shapes supported at the edges in various ways), and the simplification of the derived formulas for practical use.

The fundamental principles underlying the production of strong glue joints were established several years ago for the more familiar glues on the commonly used species. The results of this work were published (U. S. Dept. Agric. Bulletin 1500) and serve as a basis for commercial gluing operations. Recent years, however, have seen the development of new classes of adhesives whose operating characteristics differ from the aqueous glues more commonly used. The problem now is to determine the operating technique that must be used with these newer adhesives to produce consistently satisfactory joints and to make this information available as a basis for the successful use of the newer adhesives in the woodworking industry.

Another phase of the Laboratory's work on gluing involves a determination of the durability, under various conditions of service, of well made glue joints. The limitations of the common adhesives have been pretty well established by accelerated exposure tests already carried to conclusion. With respect to the phenolic resin

glues, introduced about five years ago, and the urea resin glues, introduced about three years ago, the picture is somewhat different. Wetting and drying exposure tests have been under way on the former for about four years and on the latter for something over two years. The results of these tests and of tests on animal, vegetable, and casein glues are summarized in the accompanying table. In these accelerated tests the method usually employed consists of wetting-drying cycles. An example of such a cycle involves two days soaking in water followed by 12 days drying in an atmosphere having 30 percent relative humidity and approximates the conditions that will be encountered when plywood is exposed unprotected to the weather.

COMPARISON OF GLUES UNDER ACCELERATED TESTS
3/16-inch, three-ply yellow birch plywood
cycle: 2 days soaking, 12 days drying

Kind of glue	Loss in strength of glued joint		
	Soaked and tested soon after gluing	Tested after 2 years	Tested after 4 years
Animal	Complete		
Vegetable	Complete		
Casein	Slight	Complete	
Blood	None	Moderate	Marked
Urea resin	None	Slight	(No data)
Phenolic resin	None	Slight	Slight

It may be noted in the table that the starch and animal glues lost all their strength at the first soaking. Obviously they are not the answer to a completely weather-resistant material. The casein glues are much more water resistant, but in cyclic tests involving soaking and drying, casein joints usually fail in something less than 2 years. They are excellent glues for mild conditions of exposure and have the advantage that they can be applied cold. The blood glue lost its effectiveness toward the end of 4 years, or 200 cycles of accelerated moisture changes, and the failures of the test samples were in the glue. The phenolic resin glues, on the other hand, still maintained a high standard of strength and a high percentage of wood failure at the end of 4 years (indicating that the glue is still nearly as strong as the wood substance). The results seem to justify confidence in the use of resin-bonded plywood for house construction and other outdoor use. The tests on the urea resins have not been under way long enough to complete the four-year comparison in the table.

Supplementing the accelerated tests, the Forest Products Laboratory is carrying out simple exposure tests on a year-round outdoor test rack. This test, except for early failure of glues already shown by observation and by the accelerated tests to have low durability, has not been in progress long enough to produce conclusive test data.

For several years there has been under development at the Laboratory a system of prefabricated panel house construction, aimed at exploring some of the possibilities of unit construction. First the feasibility of shop manufacture of plywood panels was established, as well as the practicability of the system. This was followed by studies directed toward the solution of various technical problems, such as improved fire resistance, incorporation of

¹Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

moisture barriers, and the use of synthetic resin-bonded plywood. The results of these developments have been incorporated as far as possible in two experimental prefabricated houses recently erected at the Laboratory and now undergoing various tests. A number of builders are already incorporating the principles of this development in varying degrees in commercial housing construction.

There are, it is known, many difficulties besetting the widespread introduction of any type of prefabricated construction, not a few of which must be ironed out in mass production rather than experimental stages of the development. Only time will tell whether these difficulties can be overcome soon enough to let prefabrication take its part in meeting the present housing shortage, and in providing increased employment of labor now unutilized.

A number of types of walls have been tested at the Forest Products Laboratory with respect to the control of moisture condensation, thermal conductivity, and vapor transfusion, and these investigations are of special importance with respect to plywood.

Tests are still under way on moisture barriers to prevent condensation of moisture within the walls and the attendant evils, such as failure of paint coatings, structural decay, and discoloration of interior surfaces. The tests are not complete, but enough information is available to permit the selection of a number of materials that are highly resistant to the passage of water vapor when applied to the warm side of the dew point position in the wall. Among these materials are (1) asphalt impregnated and surface coated sheathing paper, glossy

surfaced, weighing 35 to 50 pounds per roll of 500 square feet, (2) laminated sheathing paper made of two or more sheets of kraft paper cemented with asphalt, and (3) double-faced reflective insulation mounted on paper. The moisture barrier principle has been incorporated in the Forest Products Laboratory's system of plywood panel prefabrication.

The study of thermal conductivity and vapor transfusion is closely related to the work on moisture barriers. No analysis has been made at the Laboratory of the relative thermal efficiency of various insulating materials as such, but tests have been conducted to determine the over-all heat loss through walls of different construction, with and without insulation and the amount of vapor transfusion under different conditions.

Carefully conducted tests of wall panels of the stressed plywood covered type used in the Laboratory's system of prefabrication indicated that the addition of an asphalt impregnated and coated paper as a moisture barrier reduced the vapor transfusion from 0.019 gram to 0.0047 gram per square foot per hour, for a temperature differential of 70° F. and for a relative humidity in the warm room of 40 percent. In other words, the moisture movement was reduced three-fourths by the moisture barrier.

In the same tests the insulated wall panel of plywood used in the latest experimental prefabricated houses constructed by the Laboratory showed a thermal conductivity of about one-half that of the conventional uninsulated frame wall.

The fire resistance of prefabricated plywood wall panels has also been investigated. Tests have been conducted on sections of plywood walls to determine the effect of the thickness of plywood, the type of glue used in the plywood, width of studs separating plywood faces, and kind and amount of insulation on fire performance. Supplementary studies are also in progress on the production of a fire-resistant plywood and the protection that can be given to plywood by the use of fire-retardant coatings. The results indicate that plywood covered walls can by proper construction and treatment be made to give high resistance to fire.

With the growing development and use of plywood for outdoor purposes it is recognized that, if cracking, splitting, and weathering can be overcome, a highly satisfactory covering will be available that may even be used without paint. This consideration has prompted the Forest Products Laboratory to work on a method of forming synthetic resins within the fine capillary structure of wood. The process consists in soaking or pressure treating veneer (depending on whether it is green or seasoned) in a mixture of phenol and formaldehyde together with a catalyst dissolved in water. Subsequent heat treatment causes the phenol and formaldehyde to react to form a water-insoluble resin within the very walls of the wood cells.

The result is a material improved in a number of essential properties. A substantial permanent reduction in shrinkage and checking is imparted and the wood can be subsequently cut and nailed without affecting the treatment. Plies that have been treated by this method have been successfully assembled with the different types of commercial glues, and unfinished resin-glued plywood with treated face plies shows a remarkable decrease in face checking under exterior weathering conditions as compared with standard resin-glued plywood. Treated fancy crotch veneer also shows less tendency to crack and check.

There are other advantages to the anti-shrink procedure. The treatment greatly reduces moisture transfusion through plywood. Inexpensive water-soluble dyes can be dissolved in the treating solution and so fixed as to

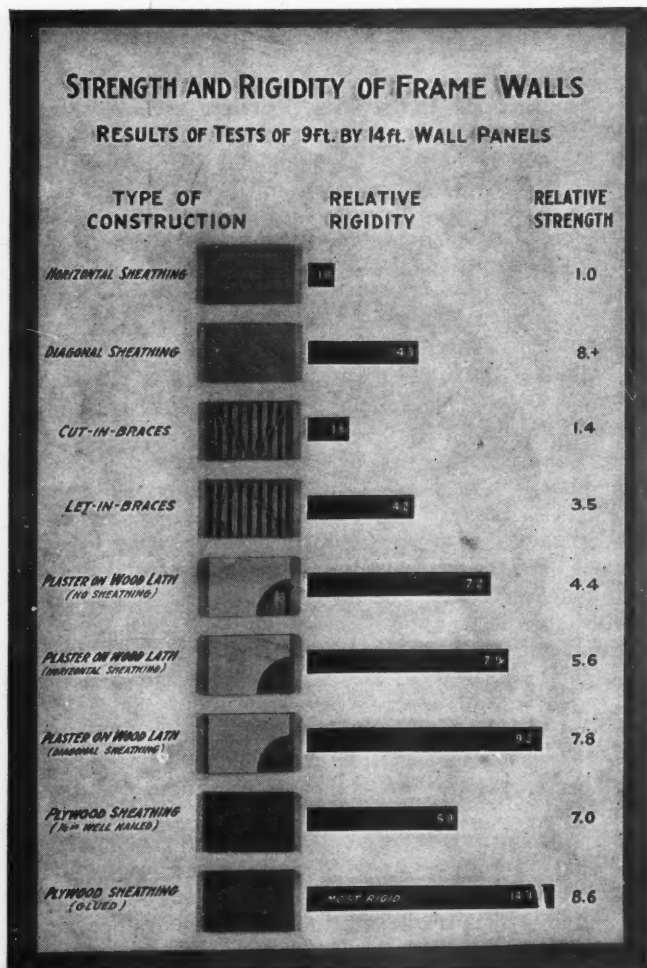


FIG. 13. Chart summary of tests on plywood and conventional wall types at the Forest Products Laboratory.

give what appears to be permanently dyed natural grained plywood. The dyeing of 1/16-inch veneers of tupelo, black gum, yellow poplar, sugar maple, aspen, and yellow birch decreased in uniformity of color in the order given. The treated wood shows a slight increase in fire resistance, an increase in hardness and compressive strength perpendicular to the grain, only a slight decrease in thermal insulating properties, and an apparent relatively large increase in acid resistance and resistance to decay. Physical properties other than those mentioned are not materially affected.

Indications are that this array of improved properties can be obtained at only a nominal increase in cost, since the cost of the materials used per unit of surface is low. For example, the chemicals required per square foot of 1/16-inch veneer of average specific gravity, in order to give an adequate improvement in properties, would cost

about one cent. If the dyed wood were considered an acceptable substitute for painted wood for house sheathing, the treated dyed plywood would cost about the same if not less than the untreated plywood plus paint. There thus appear to be economic possibilities for the use of this treatment. Further checks and determinations are needed to work out the possibilities of the treatment, but the results obtained to date would seem to indicate a trend toward a plywood with radically improved durability and all around utility.

This brief statement of the work the Forest Products Laboratory is doing on plywood indicates that progress is being made in the scientific development of this comparatively new building material. As already pointed out, a vast amount of research remains to be done, particularly with respect to determining the strength properties of plywood of various number of plies and thicknesses.

Plywood in Farm Construction

by HENRY GIESE

Professor of Agricultural Engineering, Iowa State College

PLYWOOD offers many advantages in farm construction because of its strength properties, availability in large sheets, and its relative freedom from splitting. A research project sponsored by the Douglas Fir Plywood Association in the Iowa Agricultural Experiment Station has been directed toward a study of farm housing problems and the improved use of plywood in farm construction.

A poultry brooder house* was selected for the first study. Poultry raising is practiced to a large extent in nearly all of the states. A light movable house is needed to keep the chicks on disease free ground. Conventional brooder houses are heavy, structurally flimsy and expensive. The brooder house herein described weighs less than half as much as most which are now being made, is considerably cheaper in cost of materials and is so superior structurally that direct comparison is difficult. Undesirable air infiltration is eliminated.

The house (Fig. 14) has an arched roof formed of plywood sheets over glued bent rafters. Curved construction was selected because of strength advantages, and reduction of cubage and exposed area still providing easy accessibility by the operator. Joints were glued and nailed. A roll roof covering was cemented and nailed

over the plywood to eliminate exposure to the weather and add to the insulating value. The exposed end walls were made of resin bonded plywood. Aluminum paint on the exterior assists in keeping the house cool on bright hot days and on the inside, conserves the available light.

As movable houses are subjected to severe racking when pulled around, it seemed desirable to make a test which would closely approximate use conditions. A shed-roofed and a gambrel-roofed house were also tested to get a comparison between the new house and conventional construction. In the test, the ends of the skids were blocked off the floor after which the block under the end of one skid was removed. The results of the test are shown on the accompanying chart, Fig. 15. It will be noted that the shed-roof house settled slightly more than four inches under the weight of the structure alone. Load increments applied over the unsupported end depressed the corner until failure appeared imminent. Under a load of 650 pounds, the deflection reached 8 inches. Upon removal of the load, the deflection was still 7 7/8 inches.

The gambrel-roofed house settled only 1 1/2 inches when the block was removed. However, a total of 530 pounds increased the deflection to 5-3/16 inches and evidences of structural failure appeared. After removal of the load, the deflection was 4-3/32 inches.

When the plywood house was tested in a similar manner, the deflections were so small that measurements were taken in thousandths of an inch with a dial gauge. A load of 759 pounds resulted in a deflection of only 227 thousandths of an inch and produced no evidence of structural failure. A complete recovery resulted when the load was removed.

The plywood house was then given a vibratory test to simulate the effect of dragging it over rough ground producing impact loadings. A small bench grinder with eccentric weights on the shaft in place of grinding wheels, was fastened securely to the floor of the house. By varying oscillations with a variable speed motor to synchronize with the natural period of vibration of the structure and using different sizes of eccentric weights, a vibration was secured with sufficient strain to reproduce loads of approximately half the weight of the building. This was attained at a rate of about 500 oscillations per minute.

*Note: The working drawings for the brooder house are listed in the Midwest Plan Service under Number 72706.



FIG. 14. Poultry house of Douglas fir plywood tested for strength of construction.

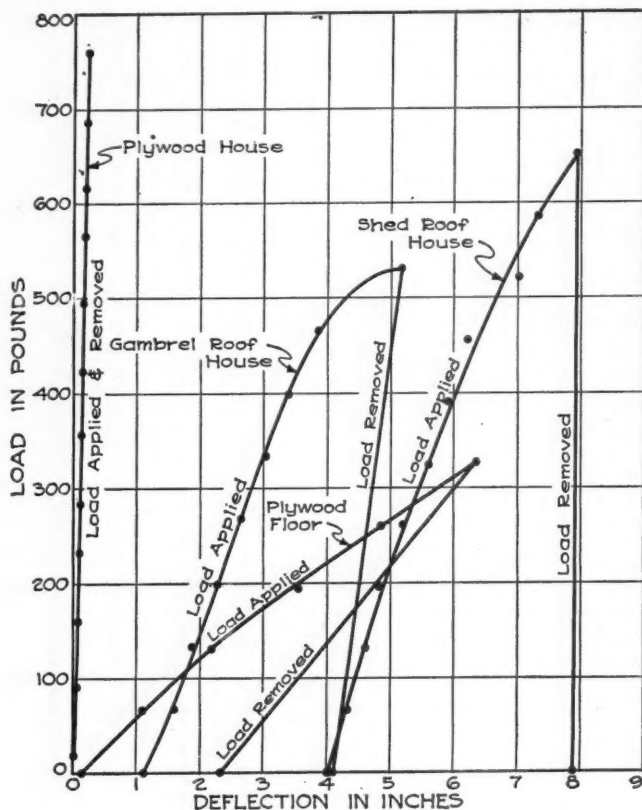


FIG. 15. Load-deflection curves for static loadings.

The house was vibrated for four hours, readings of the deflection and the number of vibrations per minute being taken every fifteen minutes. In this test more than 130,000 loads of 468 pounds were applied. The only evidence of failure in the entire structure was the loosening of two bolts which fastened the joists to the skid at the end opposite the applied load. The static test following the vibratory period showed a load deflection curve ranging as much as four hundredths of an inch greater than the original test. However, when the loosened bolts were furnished with larger washers and replaced, a third static test showed a load deflection curve almost identical to the original. No damage to the plywood structure itself was evident. The contribution which the stressed plywood made to the stiffness is well illustrated by the test made on the floor alone. It will be noted that the floor deflected $6\frac{3}{8}$ inches under a 325 pound load and retained a deflection of $2\frac{1}{32}$ inch after the load was removed.

The test results indicate that the house was extremely rigid even after the application of many loads. Apparently, all loads applied were well within the elastic limit of the structure yet, it is reasonable to suppose that in ordinary use, it would not be subjected to loads as large as those applied in the test. As the application of a static load resulted in structural failure of the other houses, no vibratory tests were made on them.

Doubtless plywood will find use in many farm buildings. Large sheets with joints made over joists, studs or headers practically eliminate air infiltration. Perhaps the greatest present weakness in farm buildings is lack of adequate bracing. The contribution which plywood can make toward greater structural stiffness is well illustrated by the tests herein described.

Plywood as an Acoustical Material

ACOUSTICS, the science of sound, involves practical considerations of both sound transmission and sound absorption, which will vary both with the materials used and their mode of application.

Walls and partitions that greatly retard the transmission of sound, whether from outside the building or from another room, are said to possess "sound insulation" value. On the other hand, surfaces of walls and ceilings, as well as rugs, drapes, furniture, and other decorations possess certain sound absorbing properties, and if especially efficient in this respect are classed as "sound deadening" materials.

Douglas fir plywood although not generally thought of as an acoustical material occupies a favorable position from either standpoint.

Tests on sound transmission were made by the National Bureau of Standards as far back as 1929 and published in Research Paper No. 48.*

It was found that both $\frac{1}{8}$ " and $\frac{1}{4}$ " plywood and $\frac{1}{2}$ " fibre boards in single sheets had virtually identical "reduction factors," in other words, they were equally good in keeping outside noises from penetrating walls.

It was further indicated that those panels which transmitted the least sound were the most rigid, and that plywood, if nailed to studs, would show still better "sound insulation." This same test series showed that walls with lath and plaster on both faces had about twice the reduction factor of single plywood sheets, so

that if the plywood were placed, as normally, on each side of a stud partition; i.e., doubled, we would expect the decrease in sound transmission to be at least as effective as for conventional lath and plaster construction.

The absorption of sound originating within a room is desirable to a moderate degree in order to prevent distracting echoes which merely indicate that sound waves reach a person's ears twice, or more; i.e., direct from the source, and also by rebound from walls and ceilings.

In most rooms the furnishings alone, especially rugs, curtains, and books, will provide adequate sound absorption, as it is well known from common experience with plastered walls.

Although definite data on the sound absorption of Douglas fir plywood are not yet available, it is known* that tests on 3-ply panels of teak showed a coefficient of .15, and plastered surfaces a range of .02 to .06, although .03 is commonly used for both plaster and varnished millwork. Douglas fir plywood, based on known acoustical principles, would be expected to show sound absorption at least equal to the denser teak panels, and somewhat superior to a plastered surface.

In residences, the areas of walls are not sufficiently great to make this a noticeable factor, especially when the house is furnished. In large rooms, as in school gymnasiums, plywood walls have demonstrated excellent acoustical properties.

*By the Government Printing Office, Washington, D.C.

*"Architectural Acoustics," John Wiley & Sons, 1932.

Plywood for Subfloors—What Tests Show

By BROR L. GRONDAL

Professor, Forest Products, University of Washington

WHY is Douglas fir plywood better for subflooring? What do tests show? How does plywood compare with shiplap and other materials when used for this purpose? What thickness of plywood is necessary? How strong must a floor be?

When the Douglas Fir Plywood Association requested the writer to answer these questions so specifically that incontrovertible proof could be advanced to architects and builders, such data seemed to be non-existent. Many tests had been made on floor sections, but not on whole floors, consisting of surface floor and subfloors combined. Therefore a series of careful tests was initiated by the writer during the past summer months. The results of these tests have been presented to the Douglas Fir Plywood Association in the form of a complete report, and are briefly summarized in this article, for they are of importance to every builder.

Most authorities recommended diagonally placed subflooring with matched or shiplapped joints, and tests at the U. S. Forest Products Laboratory* indicate that if diagonally-laid subflooring is end-matched, the end-joints can come at any point between the floor joists. According to the same authorities, in second-story construction, top floors laid on floor joists with no subflooring can have joints between the joists if end-matched material is used, even though the tests indicated that such floors might break under concentrated loads of only 250 pounds!

It is quite reasonable to assume that if such high-grade surface flooring will break so easily, subflooring of common grades of lumber must be regarded even less reliable. On the other hand, anyone who has ever used Douglas fir plywood for subflooring will at once realize that such a puny little load can be entirely disregarded. Therefore, as $\frac{5}{8}$ -inch Douglas fir plywood is the minimum thickness that has in the past been used for subflooring, the possibility of using thinner material, with attendant cost reductions, suggested itself. Tests were consequently conducted on $\frac{1}{2}$ -inch rough Douglas fir plywood, for if such plywood proved satisfactory, thicker material would obviously be proportionately stiffer and stronger.

In these tests, floor sections with a minimum area of 16 square feet were used, supported on 2 x 12-inch joists spaced on 16-inch centers, which were in turn supported on 8 x 16-inch timbers on the reinforced concrete floor of the laboratory, so that loads imposed on the floor sections would cause no bending of the joists.

A concentrated load was applied at the center of each floor section through a 2 x 2-inch Douglas fir strut rounded to a hemispherical surface at the lower end so that a "spot" contact was made with the surface of the floor. Load was transferred to this strut from the descending head of the testing machine through a horizontal beam, the amount being weighed by a platform scale at the other end of the beam. The amount of bending or deflection of the subfloor was determined by supporting an Ames spring dial gauge, graduated in 1/1000 in., on a shelf attached to the joists, with the

plunger of the dial in contact with the under surface of the subflooring immediately under the point of application of the load.

Loads were applied in increments of 100 pounds, and the corresponding deflections (or bending) were each noted after time intervals of 15 seconds. The results obtained are graphically presented in Figs. 16 and 17.

In most of these tests maximum loads of 900 pounds were imposed. The heaviest pieces of equipment or

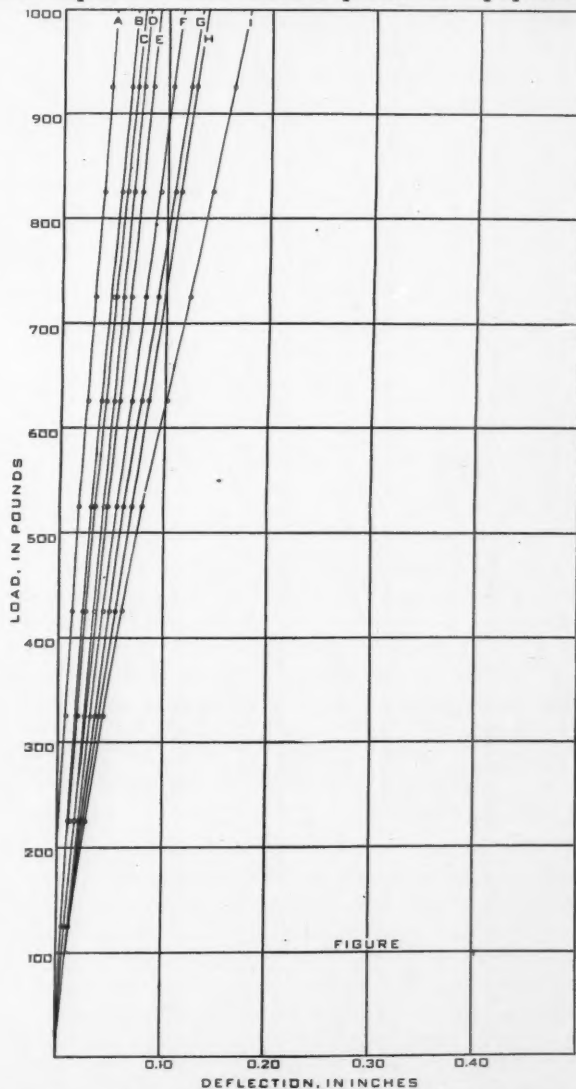


FIG. 16. A: 1 x 4 v.g. Douglas fir on $\frac{1}{2}$ -inch Douglas fir plywood with 2 x 4 distributors. B: 1 x 4 v.g. Douglas fir on No. 1 1 x 8 Douglas fir shiplap laid diagonally. D: 1 x 4 v.g. Douglas fir on $\frac{1}{2}$ -inch Douglas fir plywood. E: 5/16 x 2 common red oak and 1 x 4 D grade Douglas fir ceiling on No. 1 1 x 8 Douglas fir shiplap laid diagonally. F: As in E, but with oak strips parallel to joist instead of perpendicular. G: 13/16 x 2 1/4 No. 2 quartered white oak on $\frac{1}{2}$ -inch Douglas fir plywood. H: 13/16 x 2 1/4 common red oak on $\frac{1}{2}$ -inch Douglas fir plywood. I: 5/16 x 2 common red oak perpendicular to joists and 1 x 4 D grade Douglas fir ceiling parallel to joists on $\frac{1}{2}$ -inch Douglas fir plywood.

*"Light Frame House Construction," Bulletin 145, Trade and Industrial Series 41, Federal Board for Vocational Education, Washington, D.C., 1930.

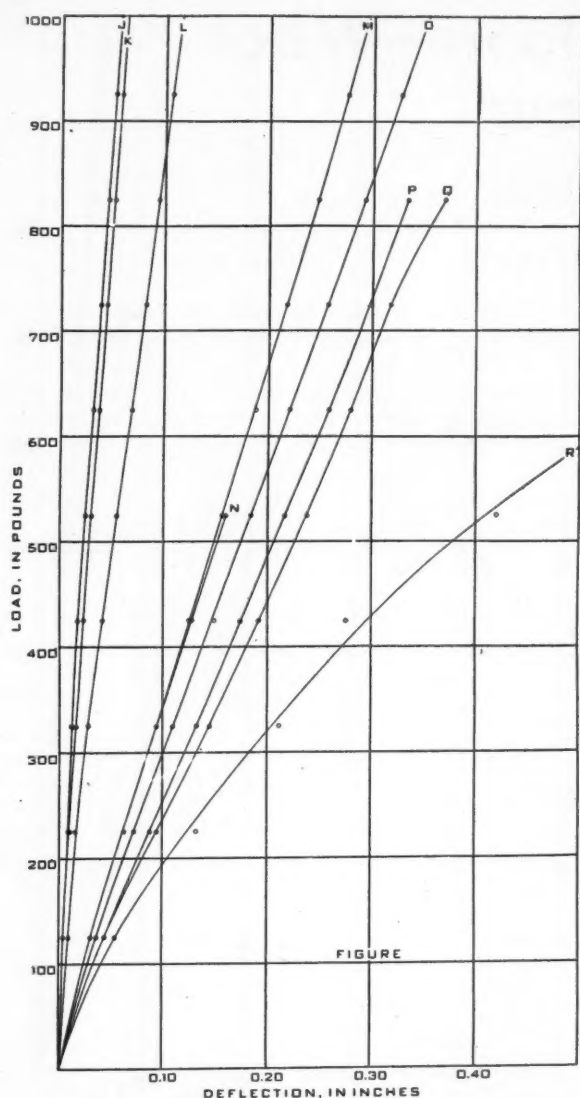


FIG. 17. J: 1 x 4 v.g. Douglas fir on No. 3 1 x 8 Douglas fir shiplap laid diagonally. K: As in J, but with shiplap perpendicular to joists. L: 1 x 4 v.g. Douglas fir on 1/2-inch Douglas fir plywood. M: 5/16 x 2 common red oak laid directly on 1/2-inch Douglas fir plywood. N: 1/2-inch Douglas fir plywood with supported edges. O: 1/2-inch Douglas fir plywood, load at midspan. P: 1/2-inch Douglas fir plywood with one supported edge. Q: Diagonal No. 1 1 x 8 Douglas fir shiplap. R: 1/2-inch Douglas fir plywood with load concentrated 1 inch from edge at midspan.

furniture used in homes do not impose caster loads that even approximate this figure. A grand piano, for example, imposes a maximum load, per caster, of only 275 pounds, and therefore this represents about the maximum spot load that a floor section will be called upon to support in the average better class home.

A careful inspection of the surfaces of floor sections made while they were supporting the high concentrated loads that were applied in these tests indicated the desirability of listing as acceptable only those floors which deflected under load so slightly that (a) heavy objects could be moved on casters without "running up hill," (b) no discernable deflections would be produced on waxed and polished floor surfaces under standing objects and (c) well finished surfaces would remain smooth and level, thus maintaining the cost of waxing and polishing at a low level. Upon this basis, floors so rigid that the subflooring deflects less than 0.05 in. under a concentrated load of 300 pounds may be considered as wholly acceptable.

Floors sections A to L, inclusive, (see Figs. 16 and 17), satisfy the above requirement, and present such a high safety factor that these combinations can be used in any room in residence construction. In short, they show that 1/2-inch rough or unsanded 3-ply Douglas fir panels of standard wallboard or sheathing grade can be used for subflooring under Douglas fir or oak finish floors (of standard thickness, nominal 1-inch flooring or its equivalent in combinations of oak and Douglas fir) with complete assurance that a strong and satisfactory floor will result.

During this study, tests on subflooring alone were also made, to determine, if possible, the hazard that various subfloors might introduce during the course of the construction of a building. Subflooring must be strong enough to carry barrow loads of material—it must be able to support the legs of a ladder which in turn is supporting a workman carrying a shoulder-load of building materials. It seemed evident that subflooring of common grades of lumber with relatively large knots, or even knotholes, would, in a great many instances, present a real accident hazard. How reliable would 1/2-inch Douglas fir plywood be, under the same conditions?

The results of tests on various forms of subflooring are shown in Fig. 17. Test "O" indicates that 1/2-inch Douglas fir plywood will safely carry a load of at least 800 pounds in the middle of a panel, midway between the joists. Test R shows that even one inch from the edge of such a panel at midspan between joists such plywood will carry a sharply concentrated load of more than 500 pounds, a load not likely to be exceeded, or even approached, in ordinary building construction.

Low grade square-edged lumber, only 70 to 80 percent as strong and stiff as Douglas fir shiplap, is often used for subflooring to take advantage of the heat-insulating qualities and the relatively high stiffness factor that wood, in general, possesses. Douglas fir plywood offers the additional advantages of freedom from shrinkage cracks, lack of a tendency to develop squeaks, extremely high lateral stiffness and high diaphragmatic strength as well as a sharp reduction in the cost of application to the floor joists.

New Building Codes Approve Plywood

PLYWOOD Sheathing and Subflooring were given final approval by the Pacific Coast Building Officials Conference at Reno, Nevada, October 4-7, 1938. As a result, plywood will receive formal recognition in the new printed editions of the Uniform Building Code.

This Code, originally drafted in 1933, has been kept up to date through revisions and amendments approved at the Annual Conference of building officials from cities sponsoring the Code, and through the cooperation of prominent engineers and architects and technical representatives from industry.

As a result, more cities are continually adopting this Code as a model and to date 215 cities and counties, representing a population of nearly 7 million, are now operating under some form of the Uniform Building Code. Included are such cities as Utica, N. Y.; Birmingham, Ala.; Los Angeles County, Calif.; Miami, Fla.; Salt Lake City, Utah; Houston and Dallas, Tex.; Peoria, Ill.; and Denver, Colo.

The Code recognition of plywood as structural sheathing and subflooring constitutes an important milestone in the ever-widening use of this fascinating and versatile material. The Code also defines plywood and requires that it conform to the U. S. Commercial Standard

CS45-36. This Standard, as already described (See introductory article by Philip Garland) has been revised and improved in the last U. S. Commercial Standard CS45-38, effective November 10, 1938, to include performance tests and requirements for both stock panels as well as the "Exterior" type or strictly waterproof panels made with synthetic resin adhesives.

The important influence of the high standards of building required by the Federal Housing Administration, especially in residential construction, is well recognized. FHA'S acceptance of 5/16" plywood sheathing for walls and roofs and of 3/8" for sub-floors, as well as "Exterior" type if grademarked, for weather exposure, is also of significance on all houses on which FHA insured loans are contemplated. In effect, the requirements of FHA serve as a national master building code.

Some cities, such as Los Angeles, in revising their

codes to provide for new materials and methods, have incorporated a special section devoted to plywood, recognizing it as a structural material for sheathing, sub-flooring and numerous other construction purposes.

In Rockford, Ill., the city council passed an ordinance last January (1938) permitting prefabricated plywood panel construction under careful specifications as to methods. Exterior type of Douglas fir plywood 3/8" thick is permitted for outside exposure glued to studs 1 5/8" deep, with 1/4" plywood also glued to the inside face of the studs. Plywood floor panels conforming to structural design requirements are also permitted.

Most city building officials are well versed in the structural merits and properties of Douglas fir plywood and as a consequence many thousands of plywood homes and other structures are now being constructed throughout the country, both inside and outside of city limits.

Stock Window Frames in Plywood Walls

SEVERAL simple and economical adaptations of stock frames to plywood lined walls are shown in Figs. 18 to 20.

Stock frames at present are made to fit a wall with standard framing covered with 3/4" lath and plaster within and 25/32" sheathing without.

Plywood wallboard (1/4" or 3/8" Plywall) on the interior, and Plyscord sheathing 1/8" thick outside, although greatly increasing the rigidity of the wall, actually decrease the thickness from 1/2" to about 1", depending upon whether plywood is used only inside for wall paneling or for this and exterior sheathing as well.

In many sections, notably the northeastern states, stock

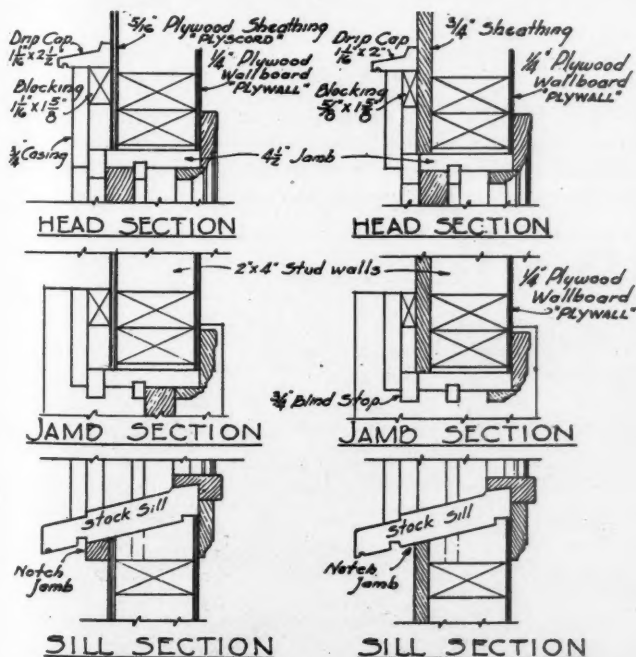
frames are used almost exclusively for the average job. The details in Figs. 18 and 19 are easy methods of making the stock frame fit the thin, rigid, and airtight plywood wall, with either plywood or lumber sheathing, in an attractive manner that preserves the savings from plywood use.

These drawings on the framed details illustrate what are believed to be the simplest and most practical methods of utilizing the "stock" frames in plywood-sheathed walls.

Other methods have been used. For example, a blind stop 1/8" thick has been found satisfactory. Another detail is to allow the stock frame to protrude inside the room and to use a back band in lieu of other trim around the jamb.

Leading frame manufacturers that are aware of the new trends in building are now working on new frame designs tending toward a stock frame for plywood-lined walls.

It should be noted that the siding, shingles or exterior type plywood for the exposed surface is omitted from figures 18 and 19.



FIGS. 18 (left) and 19 (right) show simple adaptations of standard stock window frames to plywood lined walls.

In Figure 18 furring strips of stock sizes are tacked to the back of the stock 25/32" casings and nailed in place in one operation. A 2 1/2" wide stock drip cap is suggested.

Figure 19 shows "Plywall" wallboard grade on inside walls, with lumber sheathing on the exterior face. Here the furring or blocking need be only 5/8" thick, and the stock drip cap 2" wide. A similar detail can be used with Plyscord sheathing if interior finish is lath and plaster.

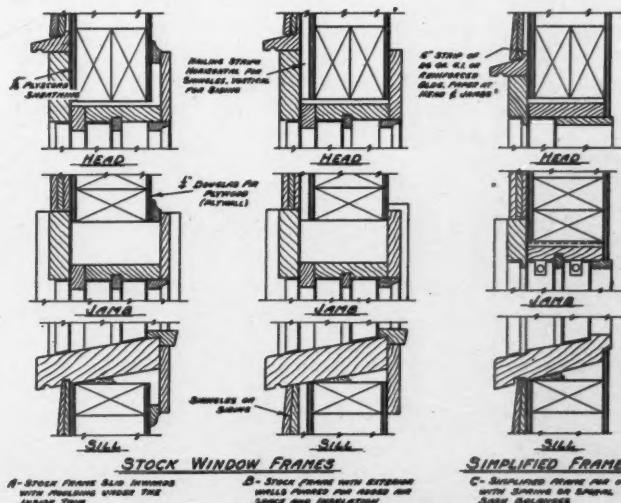
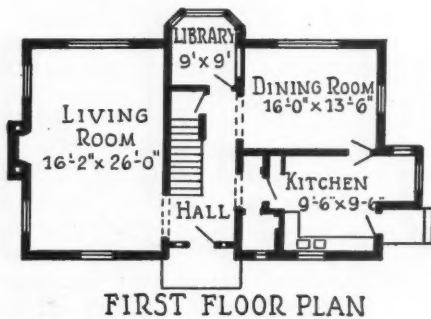
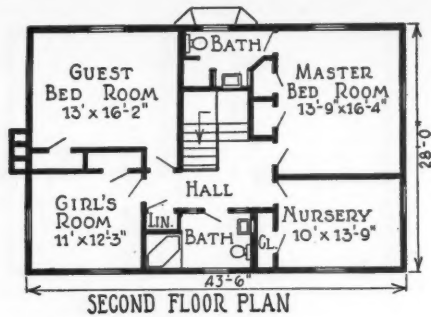


FIG. 20. Details A and B show stock frames in which inside jamb liners have been removed. Stock frames without liners would require a somewhat thicker molding (1-1/16" thick) under the inside trim in Detail A.

In Detail B, if without inside jamb liners, there are three methods available: (1) use thicker (1-1/16") furring strips on outside wall over the plywood and building paper (2) use thin furring strips under inside trim (3) rip frame to proper width.



How A House Grew With Plywood

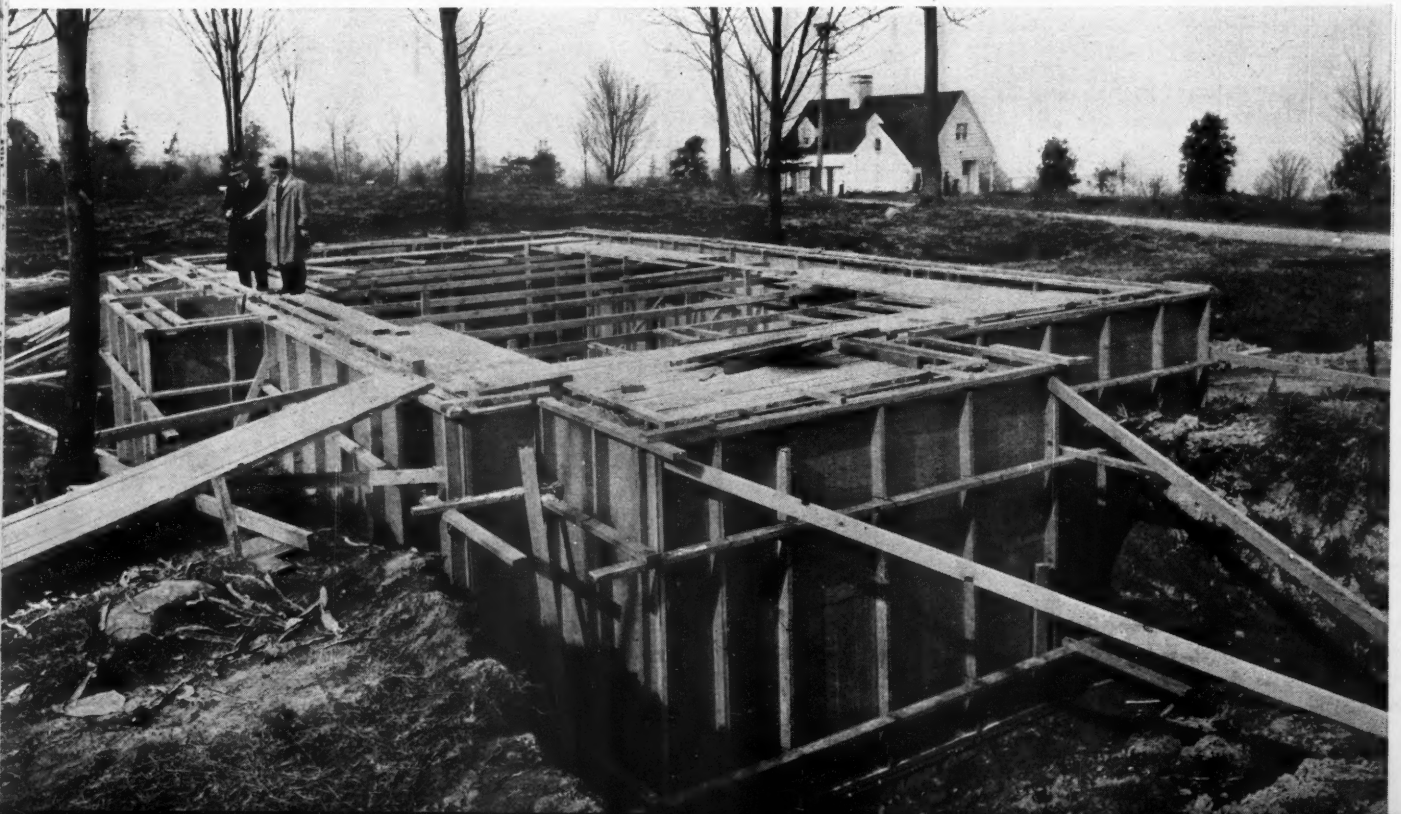


ABOVE: The Blue Ridge-"Good Housekeeping" Exhibition House built in Seattle, Washington, by Hugh Russell, Builder; T. Francis Bellamy, Architect; sales price \$14,500. A total of 11,000 square feet of Douglas Fir Plywood was used on this job.

THESE PICTURES tell more graphically than words how plywood can be used in the building of a home. This is a step-by-step study of the part this versatile material plays in forming the foundation, in laying the floors, in framing the walls and the roof, in providing sturdy interior wall and ceiling covering, in assuring dustproof closets, cupboards and built-ins.

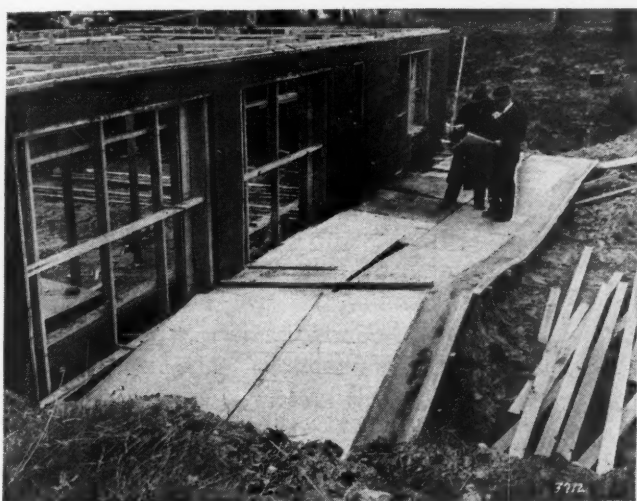
Built in Seattle's Blue Ridge Addition by Hugh Russell, this home was awarded the Good Housekeeping Shield for excellence in construction and design. The plans, drawn by T. Francis Bellamy, architect, called for a total of 11,000 square feet of Douglas Fir Plywood of various grades and thicknesses.

BELOW: PLYSCORD sheathing $\frac{5}{8}$ " thick, was used first as Concrete Form material for the foundations. If this material were to be reused for Concrete Forms on other foundations PLYFORM would have been specified. Architect Bellamy is shown inspecting the work.





ABOVE: Stripping the PLYSCORD panels from the forms, as in erecting them; is easy and saves time. The smooth concrete surface requires no finishing or rubbing.



ABOVE: Once the $\frac{5}{8}$ " PLYSCORD has been stripped from the concrete, it is cleaned and then reused as the sub-floor. Builder Russell calculated that substantial savings in labor and job time were effected in the use of PLYSCORD for forms.



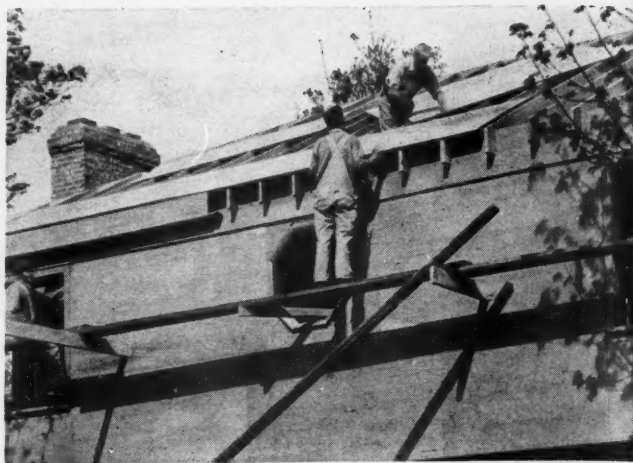
ABOVE: PLYSCORD sheathing now being laid for the sub-floor. Builders report time savings with this construction as high as 60% compared with laying a diagonal shi lap sub-floor. TOP PHOTO: Fitting $\frac{5}{16}$ " PLYSCORD sheathing around an opening, emphasizing the minimum of cutting necessary, with plywood.

COMPLETED plywood sub-floor. This has great warmth; gives the utmost in rigidity; makes an ideal working platform for laying out partitions, and for prevention of accidents due to men stepping on loose boards.

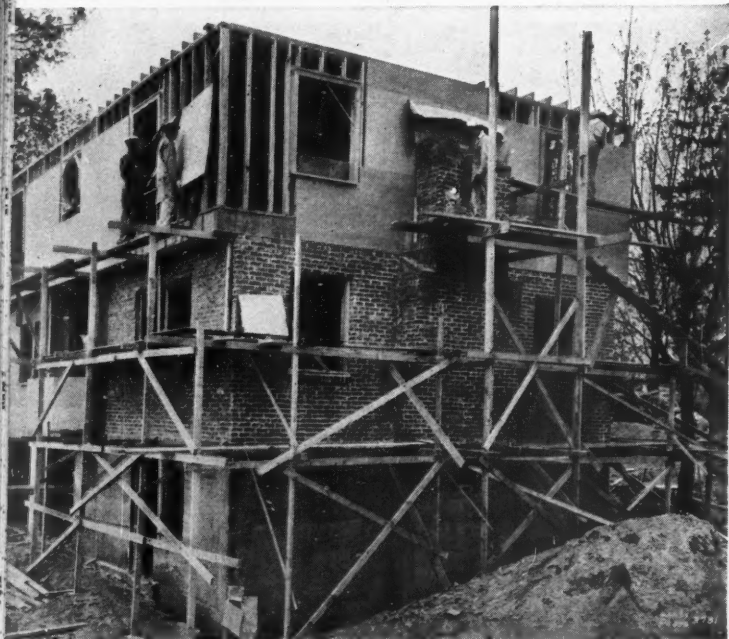




BRICK veneer was applied over PLYSCORD on the first floor. The rigid plywood under the veneer provides a warm and airtight undercoat for the house, and is a splendid nailing base for brick ties.



HERE the 5/16" PLYSCORD is laid as roof sheathing. On some jobs 3/8" may be used if rafter spacing and snow load make this advisable. Nailing strips are placed over the tight Plywood roof on this job and when the shingles are applied the extra air space will add still more to the warmth and insulation value of the roof.



BELOW: U. S. Forest Products Laboratory tests indicate that Plywood sheathing makes walls 5.9 times more rigid than horizontal and 40% more rigid than diagonal shiplap sheathing.

"INSPECTED AND APPROVED"

OPENED to the public late in September, the house was inspected by thousands who commented on its compactness, which insulates against summer's heat and winter's cold, and the beauty of the room decorations, arranged under the supervision of Helen Koues, Director of the Good Housekeeping Studio.

BELOW: Certigrade Red Cedar shingles are applied to the Plywood sheathing. Experts compute that it would take a 300 mile per hour gale to loosen the shingles from the Plywood.



WORK
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tile.

CON
BLUE

Tile, C
Mason
Lok-Jo
Co.; S
& Tow
Stand
Co.; C
Bryant
Co.; C
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WORKMAN applying PLYWALL, the wall-board grade of Plywood to the walls of one of the bathrooms where it served as the base for tile. In kitchen also it served as tile-base.



ABOVE: PLYPANEL grade of Plywood being applied to the walls of the recreation room in the basement. As wall covering for rooms of this sort Plywood is a preferred material.

INSIDE AND OUT PLYWOOD DID ITS BEST

TYPICAL of hundreds of similar building jobs during 1938, this Model Home emphasizes again the adaptability of plywood as an all-purpose building material.



BELOW: The modern, convenient kitchen. Plywood here served as the base for the tile and as the enameled finished wall surfaces.

CONSTRUCTION SPECIFICATIONS BLUERIDGE HOUSE

Tile, Gladding McBean Co.; Wall Tile, Colotyle Corporation on Masonite Base; Plaster, United States Gypsum Company; Insulite Lok-Joint Lath, Insulite Co.; Dimension Lumber, Weyerhaeuser Sales Co.; Sheathing, Douglas Fir Plywood Association; Hardware, The Yale & Towne Mfg. Co.; Paint, Pratt & Lambert Inc.; Plumbing Fixtures, Standard Sanitary Mfg. Co.; Heating, Oil Burner, General Electric Co.; Circuit Breaker, Panel Boxes, Square "D" Company; Switches, Bryant Electric Company; Armco Sheetmetal, American Rolling Mill Co.; Certigrade and Royal Shingles, Red Cedar Shingle Bureau; Linoleum, Sloan-Blabon Corp.; Glass, Libbey-Owens-Ford Glass Company; Wallpaper, Richard E. Thibaut Inc.; Imperial Paper & Color Corporation, Artcraft Wallpaper Co.



Uses for Exterior Type Plywood

THE inclusion of "Exterior" plywood, with appropriate performance tests, in the new U. S. Commercial Standard (CS45-38) for Douglas fir plywood climaxes the development work and practical experience of the past few years in perfecting panels with strictly waterproof adhesives.

Exterior plywood's availability widens the field of use for permanent exteriors of buildings and stores, for signboards, marine structures, gusset plates in trusses and frames, and for other uses involving exposure to weather and moisture.

The plywood, like any other wood product should be thoroughly painted on both faces and edges; and moisture should be excluded from joints.

At least one paint manufacturer has developed a special exterior paint for Douglas fir plywood. This paint, with a resin vehicle, has certain fire resistant properties and was produced to meet the rigid requirements of the San Francisco World's Fair authorities with respect to both fire and moisture. This paint can be applied either with spray or brush to secure a variety of textured finishes, some of which are similar to stucco.

Cutout signs of infinite variety, store facades, traffic signs, and both flat and curved exposed surfaces can be made from Exterior type Douglas fir plywood. Furthermore, for the consumer's protection such ma-

terial is grade-marked at the mill, "Ext-DFPA," on the edge.

Exterior plywood is also economical in the long run for many construction uses ordinarily considered as "temporary," but where the opportunity exists for repeated use on one job after another—such uses as fencing, sheeting, formwork, knock-down sheds, toolhouses and other construction buildings.

Exterior type plywood comes in various appearance grades such as wallboard, sound-2-sides and good-1-side, and in almost any thickness desired—gusset plates as thick as 6 inches (49-ply) having been used on one job.

Plywood gusset plates are specially fabricated for structural use with timber ring connectors at joints of timber trusses and frames, and are a striking example of plywood's entry to the engineering structures field.



LATHS were used as reinforcing strips under the $\frac{1}{8}$ " Exterior plywood panel on the rounded corners of the J. E. Windel streamlined grocery in Portland, Oregon. They also make a flush joint possible with the $\frac{3}{8}$ " exterior grade used on the sides.



UNRETOUCHED photograph of new streamlined grocery built entirely of Exterior grade of Douglas Fir Plywood by J. E. Windel in Portland, Oregon. The saving over stucco construction was reported as 25%. No Battens were used, the joints being filled with caulking compound. L. L. Dougan, Architect.



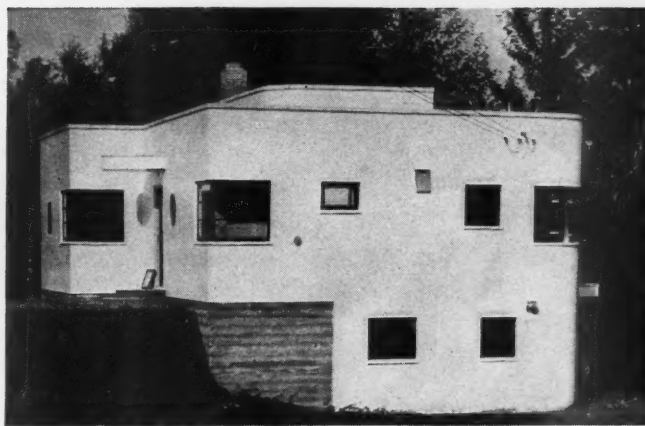
AN INDUSTRIAL Plant in the Southwest, built with a Douglas Fir Plywood exterior. The grade of Plywood used for this and for the cut-out letters is grade marked and trade marked "EXT-DEPA".



PERMANENT outdoor sign boards form an increasingly large market for the "EXTERIOR" grade of Douglas Fir Plywood. Impervious to the weather, since the glue-line is completely waterproof, many of these sign boards have been in continuous use for several years.



BUS DEPOT in Pennsylvania "covered" with "EXTERIOR" Douglas Fir Plywood. The cut-out letters shown are also of this waterproof plywood product.



EXTERIOR Plywood used as the outside surface material of an ultra-modern residence. The streamlined curved surfaces illustrate adaptability of Plywood.

Plywood for Wall Construction

by E. A. HORN

PLYWOOD walls may be divided into two main classifications—first, where plywood is nailed to conventional 2 x 4 studs; second, where glue is used in place of nails.

The gluing of plywood to framing members has been described as the second progressive step in building frame constructions in the past 300 years. The first step, the introduction of a cheap nail, made it possible to fasten framing members together at closer intervals, thereby largely eliminating the heavy timber framing with mortice and tenon joints that had been used up until that time. This permitted a reduction in the net size of the framing members. Glue in wall construction goes another step and permits a continuous bond between two adjacent framing members, thereby utilizing the full strength of the wood fibers and permitting a still further reduction in the size of framing members without destroying the ultimate strength of the wall.

The advantages of using glue in wall plywood construction are many. First, by gluing plywood to studs a reduction in the size of the framing members may be utilized without reducing the strength of the wall, with the covering becoming a structural and load-bearing part of the wall. This is in direct contrast to the conventional method of lath and plaster.

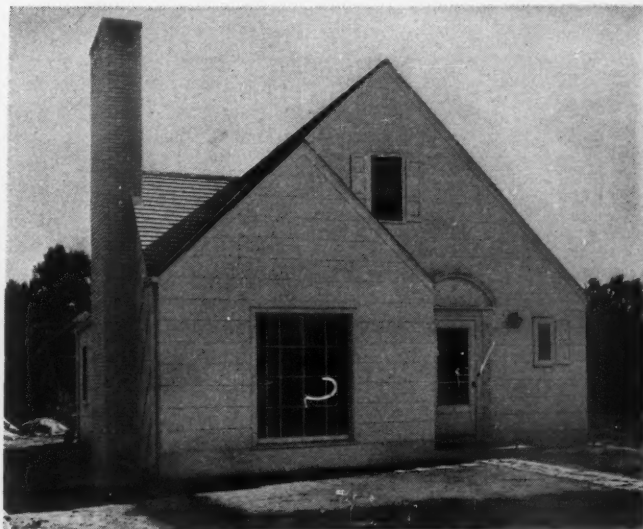
Secondly, a properly glued-up wall of plywood need have no indication of joints. Recent developments in glues, method of making joints, and plastic finishes for plywood have made these changes possible. At present, there are several satisfactory methods of gluing up plywood walls. One of these is known as the Uniwall System. It consists of nailing a 2" strip of Douglas fir plywood to the studding and spreading a self-bonding glue on this strip and applying the plywood panel thereto for the finish wall. In effect, this plywood covering becomes one piece as the two adjacent panels are solidly glued together by the strip backing the joint.

Another method of making smooth flush plywood walls with the aid of glue consists of gluing the two adjacent panels of plywood to a common supporting framing member. After the glue has set a high speed electric router with tapered router bits opens up the joint between the two adjacent pieces of plywood to a uniform size and contour. It is preferred that the

router bit take a small portion off each plywood panel. Into this is inserted a wooden spline run to substantially the same contour as the router cut. This spline is first covered with self-bonding glue and driven firmly, but not too tightly, into place. After the glue is thoroughly set the portion of the spline projecting past the plywood faces may be dressed off with an electric sander. This leaves a perfectly smooth and flush wall, which method of joint construction has been patented by the Speed-wall Company of Seattle.

A third method of making a glued joint consists of running a shiplap-like edge around the plywood panel. This joint differs from the shiplap joint in that the shoulders and edges are cut on a bevel in such a manner that they form a self-clamping joint to which glue is applied when the panels are erected. Patents have also been applied for by the Speedwall Company on this joint.

The latter two joints are suitable for exterior use (as



CONVENTIONAL-TYPE residence with siding of "EXTERIOR" Plywood. For this purpose the 3/8" or 7/16" thicknesses are usually preferred. Plywood marked "EXT-DFPA" is acceptable by the FHA with certain structural limitations.

well as interior) when used in connection with synthetic resin-bonded, exterior plywood.

Past experience has proven that 5/16" plywood well glued to both sides of a frame consisting of $\frac{7}{8}$ x $1\frac{3}{4}$ studs or ribs 16" o.c. with cross headers run horizontally 24" o.c. will give strength and stiffness equal to 2 x 4 studs 16" o.c. with siding and sheathing. Tests have been made upon such a wall, which includes loading it as a beam to 90 pounds per square foot. This is many times the wind load usually required by city building ordinances. Failure did not result in such loads and in all cases the walls resumed their original position, indicating that they were not nearly loaded to their ultimate capacity. When loaded as a column, such walls have supported loads of 800 pounds per lineal

foot, with practically no deflection and no indication of failure. Plywood as a wall finish contributes tremendous bracing strength to a building. Plywood glued to studs multiplies this bracing strength. In fact, it gives the strongest known wood wall construction. Glued construction naturally lends itself well to shop prefabrication.

Plywood walls that are prefabricated speed up the erection time of house construction by a considerable degree. This is especially true in fall, winter, and early spring building when it often requires weeks for plaster to dry out sufficiently to install the interior trim, whereas dry-built plywood walls as described, may be decorated as soon as the glue has set, a matter of a few hours.

Plywood for Temporary Fencing

EXPANSION of the use of Douglas fir plywood as temporary fencing has been pronounced during 1938. Builders have found that, with the high salvage potentials in this use of the panels, the added protection given both workmen and passers-by during construction is important enough to warrant the slight additional cost.

Ordinary store front remodeling on busy streets accounts for the largest number of uses of fir plywood as temporary fencing, although many spectacular uses have been noted. During bitterly cold winter weather, for instance, work went ahead on summer schedules when an "overcoat" of plywood was nailed to the scaffolding and the heat turned on inside as the S. M. Siesel Construction Company completed a building at W. Wisconsin Avenue and North Second Street in Milwaukee, Wisconsin.

Important to the builders and the owners, such use of plywood results in real economies when work can be completed on schedule, or ahead of schedule, and the building can be ready to receive renters sooner.

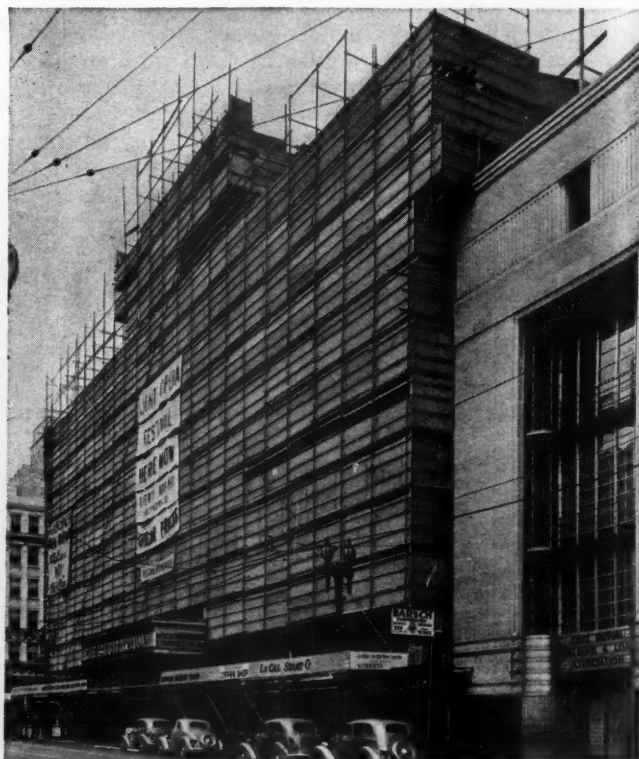
During extensive remodeling of a building, a temporary covering of plywood also may be of distinct advantage as protection to workers and pedestrians. Where facing of an old building is to be removed, or extensive sand-blasting or guniting is involved, contractors have found that a temporary structure is practical economy, even where it is not required by law.



A TEMPORARY front which serves as an attractive advertisement during remodeling is shown here. The Douglas Fir Plywood is of the "EXTERIOR" grade, which is strictly waterproof, and is to be preferred where conditions of extreme humidity apply, or where extensive reuse is contemplated.

The Baruch Corporation of Los Angeles, contractors for the extensive remodeling of the Los Angeles Philharmonic Auditorium, declared that a protective covering of plywood, when compared with the labor and expense of moving other covering material around and allowing for the salvage value, would be no more expensive than less efficient protection.

For most temporary fencing jobs, the Plywall or Plyscord grades of Douglas fir plywood will serve adequately, particularly if only one use is expected, or if re-use for interior sub-flooring is contemplated. For repeated re-use or for subsequent use as concrete form material, the Plyform grade or even the completely Waterproof Exterior grade should be used. Where conditions of extreme humidity apply the latter grade should invariably be used.



H. M. BARUCH, president of the Baruch Corp., general contractors for the Los Angeles Philharmonic Auditorium remodeling, says: "We decided on the use of $\frac{1}{4}$ " Douglas Fir Plywood for protection of the exterior of our scaffold for the reason that the extensive sand blasting and guniting on the exterior would have been very impractical to perform during the heavy traffic rush at this intersection without adequate protection."

Plywood for Formwork



STRIPPING $\frac{1}{2}$ " 5-ply Fir Plywood concrete form panels from one unit of the USHA's Buffalo Lakeview Housing projects. On many similar projects, 15 reuses and more of the plywood panels have been reported.

THE use of Douglas fir plywood as a form for pouring concrete falls into two categories.

First is the job involving multiple re-use. This may be a warehouse or other large building of several stories where there is a good opportunity to re-use form panels a number of times; or, it might be a housing project where the same plywood forms could be used on one basement wall after another. In either case, the special "Plyform" grade-marked panels, made for such multiple re-use should be specified.

Contractors should insist upon this Concrete Form Panel Grade of Douglas fir plywood, made with special highly water-resistant cold glues. Re-uses of 15 and more times are by no means rare—a case in point is the San Francisco-Oakland Bay bridge concrete road-

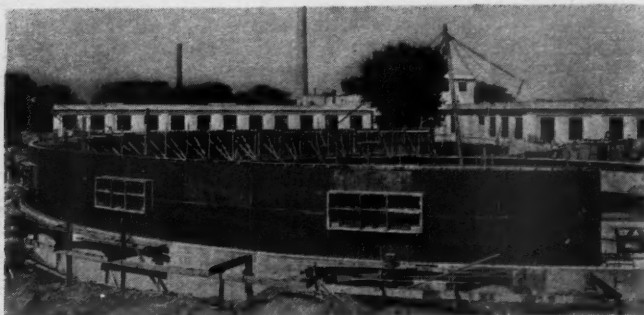
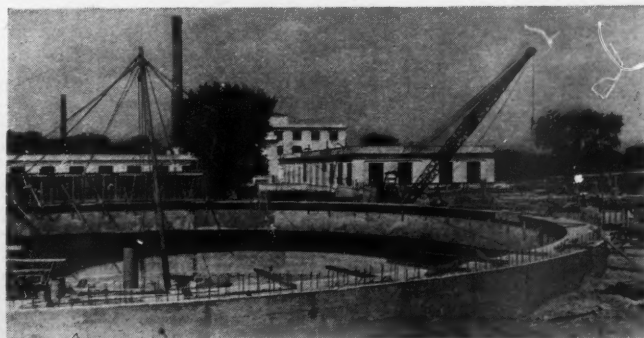
way on which Bates & Rogers of Chicago were the contractors.

Many builders find they can improve the appearance of poured concrete basement walls by using $\frac{5}{8}$ " Plyscord Sheathing for formwork, then stripping it and re-using it for sub-floors. Such floors have great strength and rigidity, are proof against air-infiltration, are economical to lay and make an ideal working platform during construction.

It is also possible to line forms with $\frac{5}{16}$ " Plyscord Sheathing backed up with solid boards, and to re-use this plywood lining for sheathing the exterior of the house—such sheathing is accepted by the FHA, and makes walls nearly 6 times as rigid as horizontal lumber and 40 percent more rigid than diagonal sheathing.



DOUGLAS Fir Plywood concrete form panels ready for oiling and subsequent use for exposed concrete surfaces of the foundations of the 74 buildings in the Buffalo, New York, Lakeview Housing project. As soon as the panels are stripped from the foundation of one building they are cleaned, oiled and taken to another unit.



PLYFORM panels in place at the St. Paul Water Works filtration plant at McCarrons Lake Station. Okes Construction Company, St. Paul, Minn., contractors. This form material is easily erected, quickly stripped and can be reused over and over again on the same job or on other jobs. ABOVE: View after stripping panels.

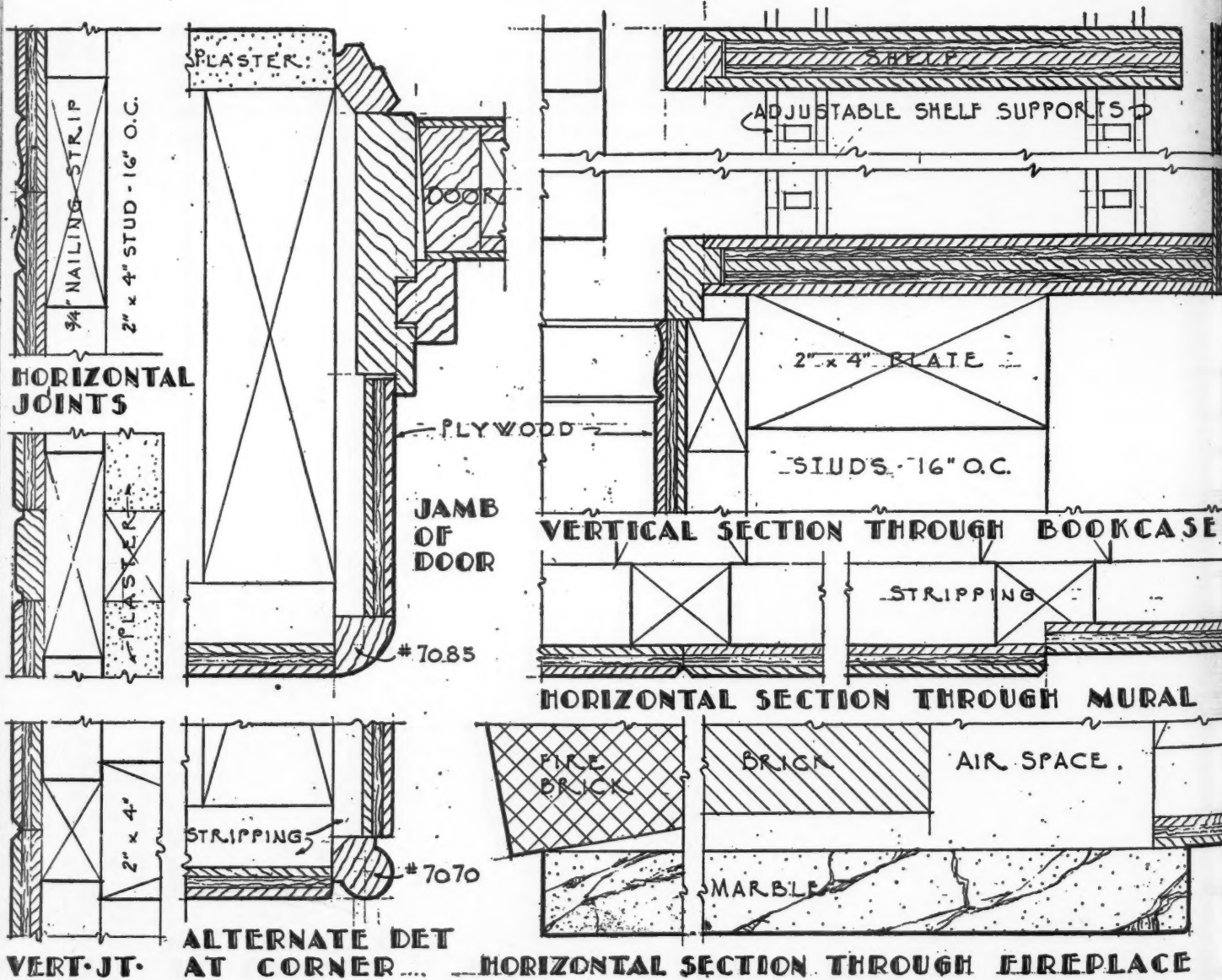
Portfolio of Architectural Plates of DOUGLAS FIR PLYWOOD PANELING

PREPARED BY CARL F. GOULD, F.A.I.A.

The first of a series intended as suggestions to the builder and architect as possible ways of applying Douglas Fir Plywood as decorative panels in modern home and shop design.

DETAILS

SCALE 1/2 FULL SIZE



These plates show the manner in which Douglas Fir Plywood may be used in a modern living room where the horizontal motif predominates. Moulded joints carry the horizontal lines across doors, as well as walls. Vertical joints are butted, using a slightly incised V joint. A decorative mural executed in sandblasted plywood is suggested above the mantel. The details show the handling of metal radiator grilles in the dado. It should be noted that insulation should be placed between the heating element and the plywood.

The color scheme in a room of this character calls for a

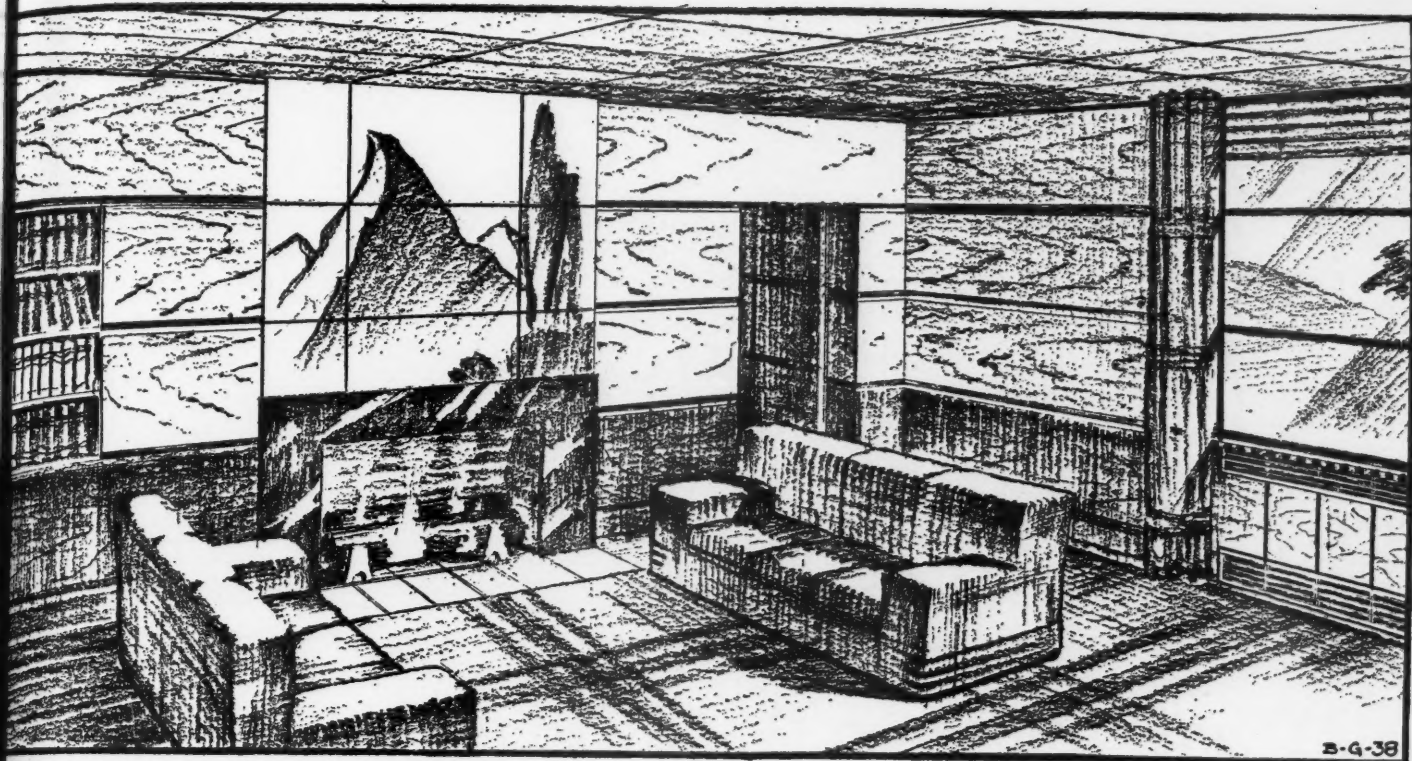
stained finish, either in gray or pale brown color, with the dado finished several shades deeper in tone. The plywood mural as on opposite page can be stained in brighter colors.

MATERIALS—Wall panels of Douglas Fir Plywood, 1/4" thick in either Wallboard or Good 1-Side grade. Book-shelves should be Sound 2 Sides grade at least 5/8" thick.

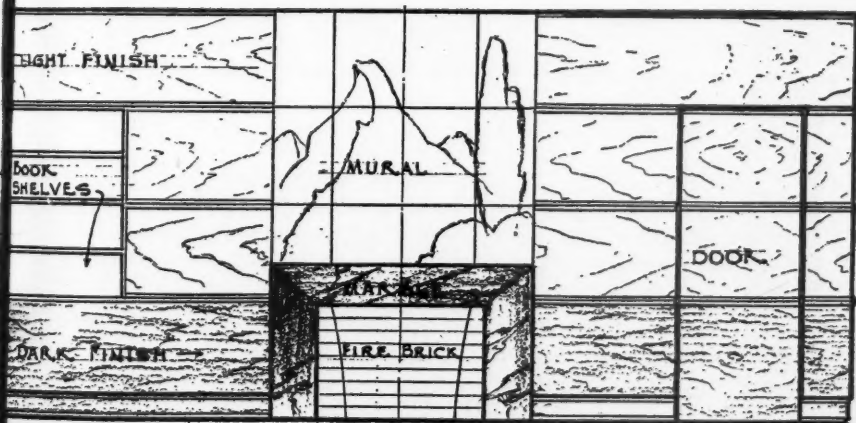
Numbers in detail drawings refer to the Standard Wood Mouldings, 7000 Series.

Nailing strips are optional with wood studs.

Nails for panels may be 4d finishing or casing.

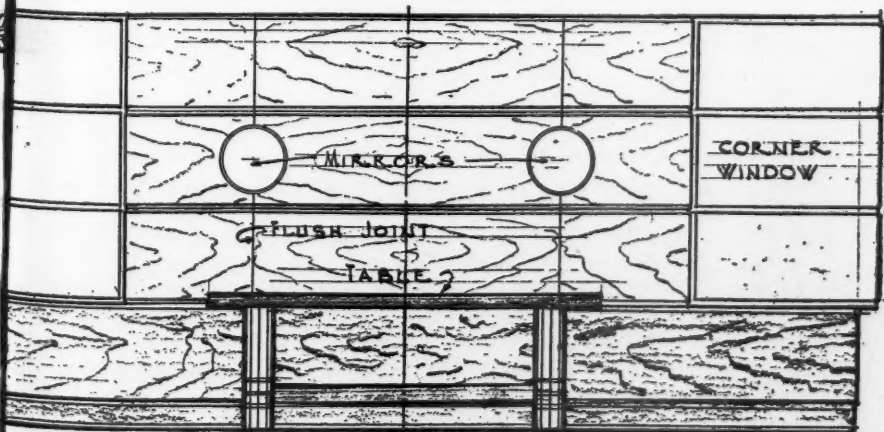


MODERN LIVING ROOM



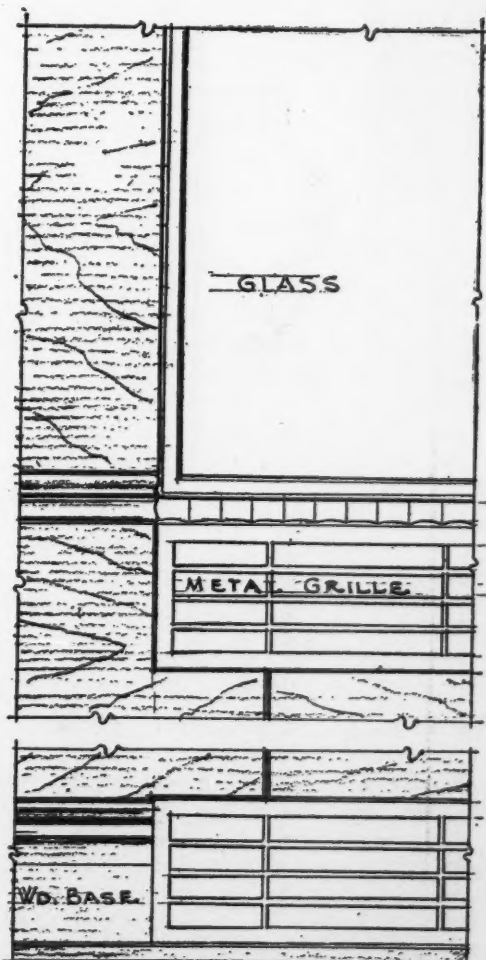
END ELEVATION

SCALE 1/4" = 1'-0"



END ELEVATION

SCALE 1/4" = 1'-0"



WINDOW DETAIL

SCALE 1/2" = 1'-0"



ONE OF THE ATTRACTIVE STREETS in Patrick Dwyer's Kenmore, N. Y., development of plywood homes.

"Dwyer Builds a Good House"



ON THE JOB (above) with Patrick Dwyer, Buffalo builder (at left) describing features of his plywood houses to A. C. Sherman, Northeastern representative of Douglas Fir Plywood Association. BELOW: Rear view of Dwyer home showing carpenters completing enclosure of bay window.

Slogan of Buffalo Builder Backed by Sound Construction. Believes Today's Builder Must "Keep Out in Front" by Adopting New Ideas Tempered by Experience

By J. B. MASON

Eastern Editor, *American Builder*

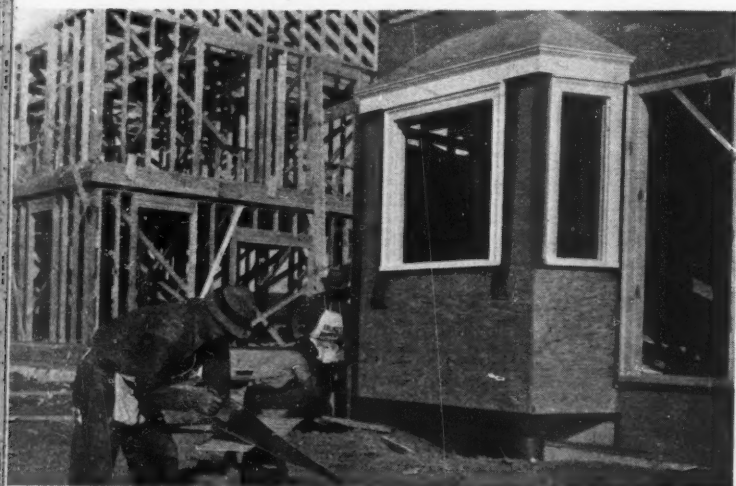
PATRICK C. DWYER of Buffalo, N. Y., has been building good houses for more than 20 years, and he now emphasizes this fact to his prospective customers by using the slogan, "Dwyer builds a good house." This slogan appears on his letterhead, on his signboards and in his advertising, and has proved of real value in his selling efforts.

Back of this slogan is a practical knowledge, experience and attention to detail that makes it mean something. He builds substantially, uses quality equipment and materials and applies the latest developments in the scientific use of materials. As he told *American Builder*, "I have found that in order to 'keep out in front' one has to be informed as to new and better ways of building and equipping homes so that the purchasers may have the advantage of every latest improvement.

"As an instance of this I was one of the first ones to use mineral wool batts for wall and ceiling insulation, and worked out a method for proper installation to eliminate condensation.

"I have lately adopted Douglas Fir plywood sheathing after its advantages were brought to my attention by the FHA people here. During the last six months I have used it exclusively for sidewall and roof sheathing in some 20 houses because of the added strength and rigidity it gives the structure, the elimination of shrinkage at openings, its ease of handling and no increase in costs."

The sheathing he uses consists of 5/16 inch Douglas Fir "Plyscord" sheathing, which is marked at 16-inch





SPEED IN CUTTING and applying exterior plywood sheathing reduce time for enclosing house.



ROOF SHEATHING of 5/16" plywood is used, over which asphalt shingles are laid on 30-lb. roofing felt.

intervals to provide guide lines for easy nailing to studding. Dwyer reported that his carpenters were able to apply the sheets rapidly, with a saving of some 25 percent in labor cost for his average house. He also found a considerable reduction in waste. The same sheathing is used on the roofs, over which asphalt shingles are laid.

Another new construction feature used by Dwyer is the Gold Bond "Floating Wall" plastering system of National Gypsum Company. The Gypsum lath plaster base he uses is nailed in place with a new type "Floating Wall" nail, the head of which is enclosed with 4 square inches of metal lath in 2 layers separated by deadening felt. This nail permits free movement of framing members from shrinkage without damage to plaster. It also reduces sound transmission in the walls, and the layer of lath on the nail head acts as a guide to insure a uniform thickness of plaster.

Dwyer reported that he asked the local building commissioner to conduct careful tests on the plywood sheathing. The commissioner's report was that he had never examined frame houses that had a higher rigidity and resistance to wind.



"FLOATING WALL" NAIL. Special nail used by Dwyer in attaching Gypsum board plaster base permits movement of framing members without plaster cracks.



FAITH IN FUTURE is shown by Patrick Dwyer who started 15 new homes this fall because he believes good business is ahead. He uses 5/16" "Plyscord" sheathing for walls and roofs.

Wisconsin Builder Perfects Plywood House

Shop-Fabricated Wall Panel Units With Plywood Facings Reduce Small Home Costs About Twenty Per Cent

By R. E. SANGSTER

Associate Editor, *American Builder*

THIS story concerns a shop-fabricated plywood panel system of house building which has been developed in the city of Janesville, Wis., by the building firm of Severson-Schlitz, who worked with the nearby Forest Products Laboratory on some of the basic ideas. Like similar systems, it uses the stressed covering principle; many of the details, however, have been worked out by Mr. Arnold Schlitz, and in these details lies the success of his system.

The first two houses put up this year were somewhat of an experimental nature to determine the practical value of certain features in the design of the shop-fabricated plywood panels. No further work was contemplated on this system when *American Builder* visited the scene of operations as an unfavorable market did not then warrant it. However, Mr. Schlitz has his system perfected to such a point that he is all ready to produce both panels and houses when local conditions improve.

The photographs on these pages show construction progress, as recorded on the second of the first two houses. After the excavating and foundation work is completed, first floor sills, joists and sub-floor are set up in the conventional manner. Here the first departure occurs because, with the panel type of construction, the finished first floor can be laid immediately and covered with paper. Wall and partition panels are then delivered from the shop and are ready to be quickly set in place.

The wall panels consist of regular spaced studding members to which are glued and nailed $\frac{1}{4}$ " plywood inside and outside faces. Severson and Schlitz also operate a separate millwork company by the same name, so they have good facilities to fabricate these wall panels. Drawings on the opposite page show how these are framed and assembled. Two interesting features are the use of a layer of waterproof paper directly beneath the inside plywood facing, which acts as a moisture barrier, and the second item is the use of supports to keep the rock wool fill in the outside wall panels from settling. These supports are merely strips of cardboard about an inch and a half wide, which are fastened at the lower end by an automatic hand stapler and bent up as shown, with the weight of the rock wool holding the upper end in place. Door and window panels are built so that the side framing members come within the over-all size of the trim which covers the joints at this point and leaves only the joints beyond the trim exposed. Wallpaper is placed directly over plywood except in painted kitchen and bath.

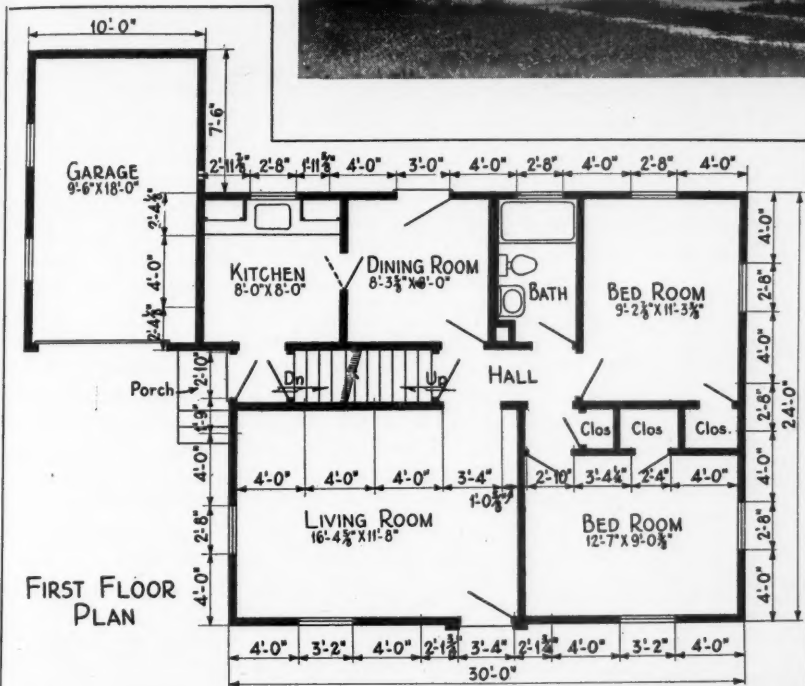
Now to return to the assembly of these units, we find that the panels as they are set up fit down over the sole which has already been put in place over the floor. After the first panel is set in place, the next one is joined to it with a channel stud consisting of a standard studding member, wall height, which has been milled down and has two pieces of plywood attached to the edges, making it the same width as standard studs within the panels. These are placed between the panels so that the joints fall over the center of the channel studs. Before the panels are pushed together, the plywood faces are coated with glue and, when in place, a light nailing is used to bond them together. When all the sidewall and partition panels are finally set in place, a continuous 2 x 4 plate is set into the top of the panels all around the outside of the building and across the inside partition, tying the whole together as a unit, ready to receive the ceiling joists and roof rafters.

This much of the work can be handled by a small crew in just a few hours, depending upon the experience of the men on such work. Beyond this point, with the exception of the gable ends which are also shop-fabricated, the balance of the framing follows conventional methods. Ceilings, however, like other interior wall finish, are plywood surfaces applied directly to the ceiling joists on the job. Siding and roofing complete the job.

LEFT, above: Shop-fabricated panel units resting on finished first floor structure ready to be set up in place. A temporary member keeps rock wool packing in units until channel stud is inserted. Below, putting up gable panels and applying roof sheathing.



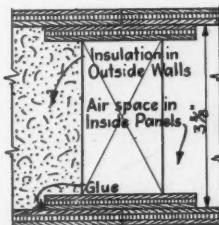
A difference between the Severson-Schlitz panel house shown at right and other unit systems is that no attempt is made to design the house for standard panels. Dimensioned floor plan below shows standard 4-foot panels used wherever possible, with odd-sized panels to fill out to needed length.



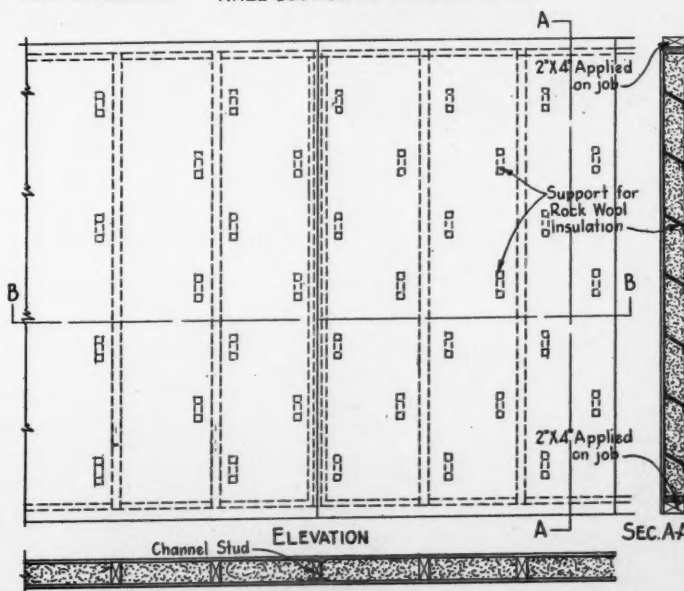
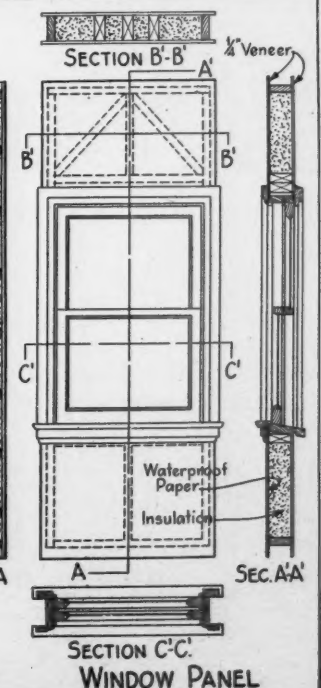
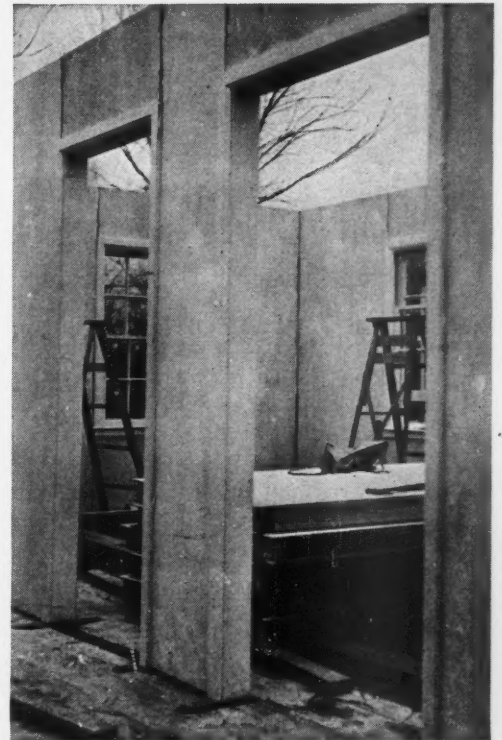
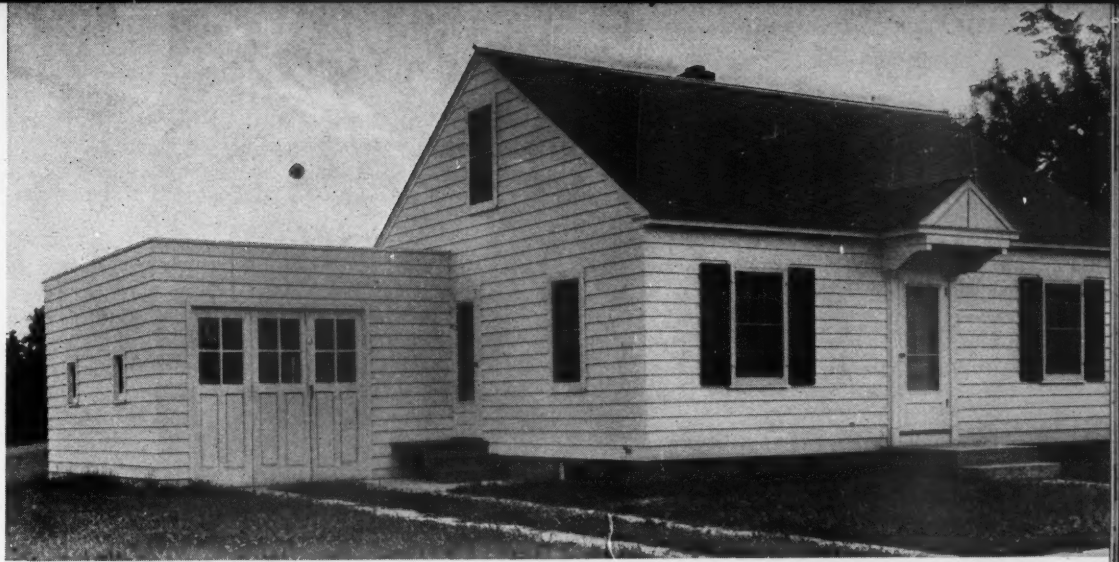
RIGHT: Construction details of panels; important channel stud section shown at larger scale. These details present the cost saving features of the system which the Janesville Building & Loan Assn., who made the loan, believes will warrant maximum financing. An outside legitimate bid on this house to be built by conventional methods ran \$4,950 without lot; using panel system, sales price with lot and liberal profit is \$4,600. Cost breakdown is given below (panel price includes millwork profit and erection cost which would be same for other local builders buying panels from Severson-Schlitz):

SHOP-FABRICATED PANEL UNITS, completely set up.....\$1,061.64

Excavation	77.76
Cement work	397.25
Hardware	58.79
Chimney	51.48
First floor	269.88
Roof materials	222.55
Siding	169.52
Garage	137.94
Labor	155.00
Painting	210.00
Plumbing	303.50
Wiring	75.00
Heating	190.00
Total Cost	\$3,380.31



WALL SECTION AT CHANNEL STUD

PLAN AT B-B
OUTSIDE WALL PANELSSECTION C-C'
WINDOW PANEL



ATH ready for sheet rubber surface.



STAIR HALL TREATMENT, second floor.



BEDROOM DETAIL showing "V" joints

He Saved \$1,500

New York Architect Uses Stock 8' x 2' Plywood Panels In Own Home. Develops Attractive Interior Finish Treatment.

WHEN Isadore Rosenfield, senior architect of the Department of Hospitals of New York City, set out to design and build a home for himself, he obtained estimates on the comparative cost of doing the entire house dry-wall plywood construction as compared with a good quality lath and plaster job. The estimates showed a saving of about \$1,500 for the dry-wall method.

The Rosenfield house, located in the Riverdale section of New York City, is finished throughout the interior with stock $\frac{3}{8}$ in. 2 by 8 ft. Douglas fir plywood on the walls and $\frac{3}{8}$ in. 4 by 8 ft. panels on the ceilings. Most of the ceilings are painted, while the walls are given various stain and varnish treatments. Kitchen

and bathroom walls are covered with sheet rubber applied directly to waterproofed plywood. Both exterior walls and interior partitions are packed with mineral wool insulation to give maximum insulation and sound-deadening qualities.

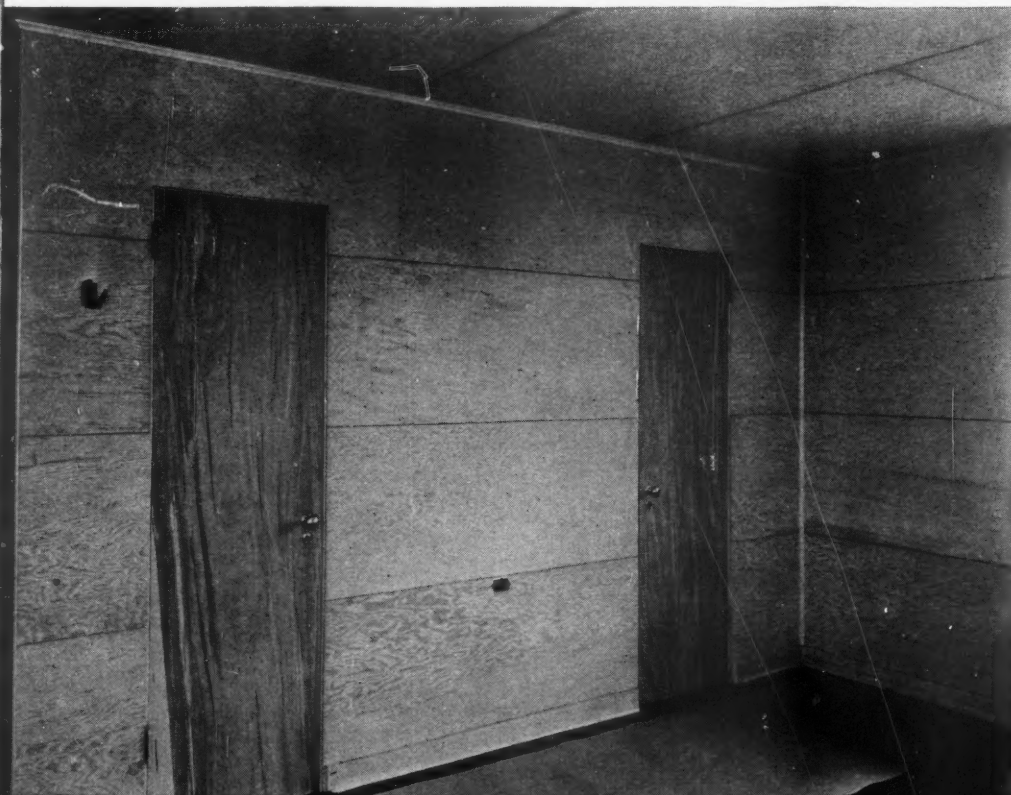
To secure a pleasing design in the interior, Architect Rosenfield laid out the placing of the 2 by 8 plywood panels for the living room as shown in the detailed drawings opposite. Horizontal edges of the panels were beveled slightly to give a "V" joint. These horizontal lines running the length of the room add to its appearance of size and give a pleasing effect.

Flush-type doors are used, with the plywood brought close up to the frame and beveled slightly. Trim is omitted. Projecting corners are handled with a small round moulding as detailed herewith. Trim around windows consists of $\frac{3}{8}$ " by $1\frac{1}{4}$ " window stop material as detailed in accompanying drawing.

Architect Rosenfield has given considerable thought and attention to the finish treatment of the plywood. Living room walls were first carefully sanded; then nail holes, joints and blemishes spackled with a filler tinted to approximately the same tone as the final wall finish. A thin coating of spackle slightly tinted is then applied with a trowel—so thin that the grain is permitted to show through. This surface is then well sanded and two coats of dull finish varnish applied.

In the bedrooms a slightly different treatment of the walls consisted of careful sanding and application of a light stain of white lead with slight tint. This was allowed to dry without wiping, after which two coats of dull varnish were applied. A further treatment may be followed consisting of rubbing this surface

MASTER BEDROOM of Rosenfield home before plywood was stained. Note flush-type doors without trim. Stock 8' x 2' Douglas fir plywood panels were used with slight "V" joint. Detail on opposite page shows corner treatment.



LIVING ROOM of Rosenfield house, showing use of "V" joint with stock 8' x 2' panels. A detailed drawing is given below.

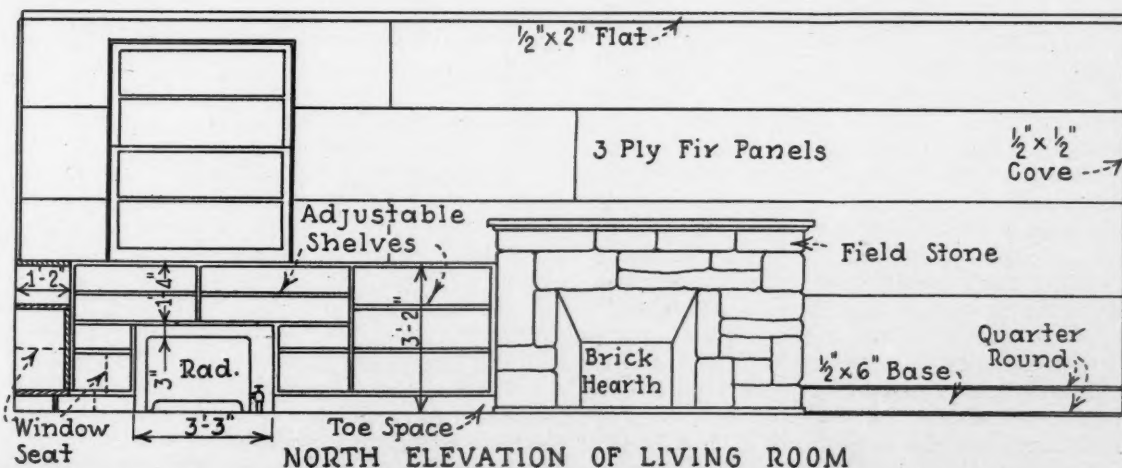
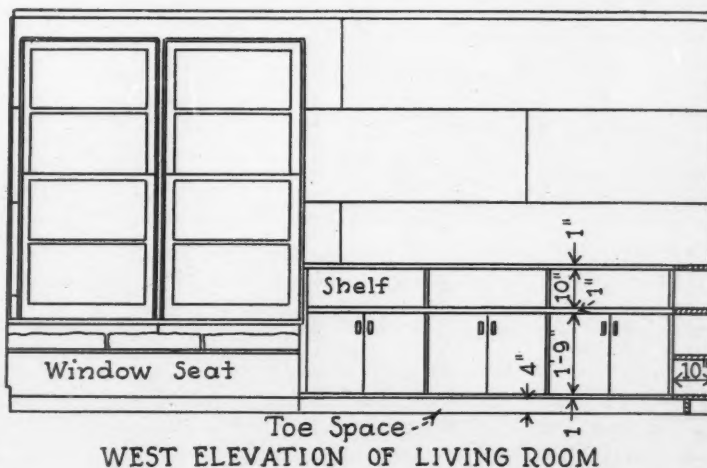
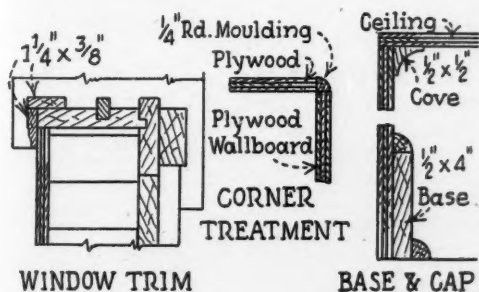


down with pumice and oil, or it may be waxed.

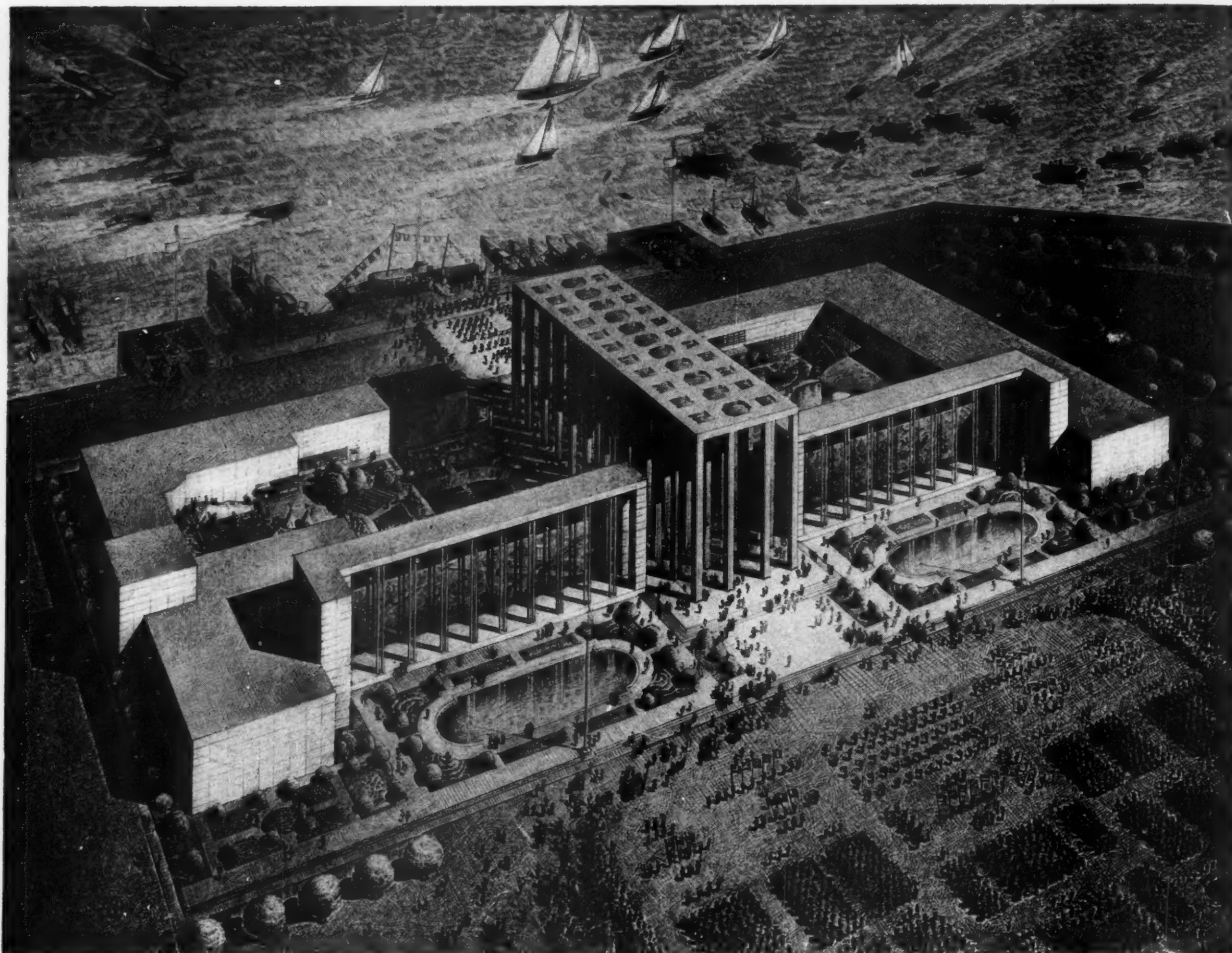
Ceilings throughout the house were given paint or enamel treatments. Joints, nail holes and blemishes were carefully spackled and a prime coat of lead and oil applied. Following this, the entire surface was covered with a thin coat of spackle, troweled out as thin as possible, allowed to dry and then sanded. Over this, two coats of paint or enamel were applied.

While interior Douglas fir plywood finishes of this type can be executed with regular stock material of "good one side" quality, the stock must be handled with care and edges protected. It is felt by some authorities that back priming of the plywood either at the mill or on the job is desirable. The need for back priming depends on moisture conditions, type of insulation and other local factors to be investigated.

HOW ARCHITECT ROSENFELD laid out the 8' x 2' plywood panels for living room. Corner detail shows use of small quarter-round moulding. Trim around windows is 1 1/4" x 3/8" window stock.



Plywood at the San Francisco 1939 Exposition



SPECTACULAR use of Plywood at the Golden Gate International Exposition where, in the Colonnade of States, 48 giant columns, 104 feet in height, are being built with webs 3" thick, 29 ply hot-pressed, resin-bonded Plywood. These gusset plates are joined with split ring connectors. T. L. Pflueger, architect.

A VISITOR to the San Francisco Exposition stepping ashore from the ferry to the pier of "Treasure Island," is impressed immediately by the magnificence of the colonnade of the States, central element of the Federal Building and focus of the Eastern shore. This colonnade consists of forty-eight gigantic columns, more than a hundred feet in the air and built up of timber posts, arranged in crosses and bound together by large thick plates of Douglas fir plywood placed on edge. These plywood plates, acting as webs for the built-up columns, are 3" thick (29-ply) and 3'-8½" high by 6' long. They are "Exterior" type plywood made with a strictly waterproof, synthetic resin glue and designed to meet exact structural stresses.

As the visitor turns his attention to other points of interest, a panorama of new architectural style unfolds itself. Building after building in the concession area is covered with Douglas fir waterproof "Exterior" Plywood. A new style is presented. A new trend is here.

The Women's Building by William Wurster; the Federal Building from the designs of T. J. Pflueger; the Alameda-Contra Costa Building; the display of the Shasta-Cascade group, are among those cased in "Ex-

terior" type, Douglas fir plywood. In the interiors literally acres of Plywall, the Wallboard grade of plywood, have found application.

Here, surely, is proof of man's scientific facility. Plywood, by the cross-banding of veneers and the binding of these veneers into large, strong, light sheets, has modernized wood.

World's Fairs have exercised positive influence upon the architecture of the world. The 1893 Chicago Exposition gave us the columnar Renaissance of the nineteen hundreds. The 1933 Fair in the same city introduced "modern" to the American public. This style has taken over the design of our commercial structures and the "streamline" vogue is a direct outgrowth of the latter Chicago Exposition.

The San Diego and San Francisco Fairs of 1915 were largely responsible for the "Mediterranean" architecture of the West.

So, too, the San Francisco Exposition of 1939 is destined to establish a new architectural trend through the use of "Exterior" plywood.

To those who wish to consider the future, a powerful and dynamic force may be seen on the skyline. This



THE BUILDING of the Shasta-Cascade (California) County building cased in "EXTERIOR" type Douglas fir plywood shown before it was painted. In the interiors literally acres of Plywall, the Wallboard grade of plywood, have been used.

force, "Exterior" Douglas fir plywood, appears destined to have far-reaching effect upon basic structural methods and upon design.

Douglas fir plywood, as utilized in the San Francisco Exposition, definitely establishes plywood as an agency of influence. As one architect visiting the Fair has stated, "San Francisco gave us color and stucco in '15. They are now set to make us *plywood conscious*."

The Federal Building as a leader in the trend may be mentioned in further detail. The design is "modern" in the proper meaning of the word. That is, it is structurally sound, expresses its materials honestly. It is

crisp and alive and is obviously the design of a "modern" man in sympathy with plywood as a modern material.

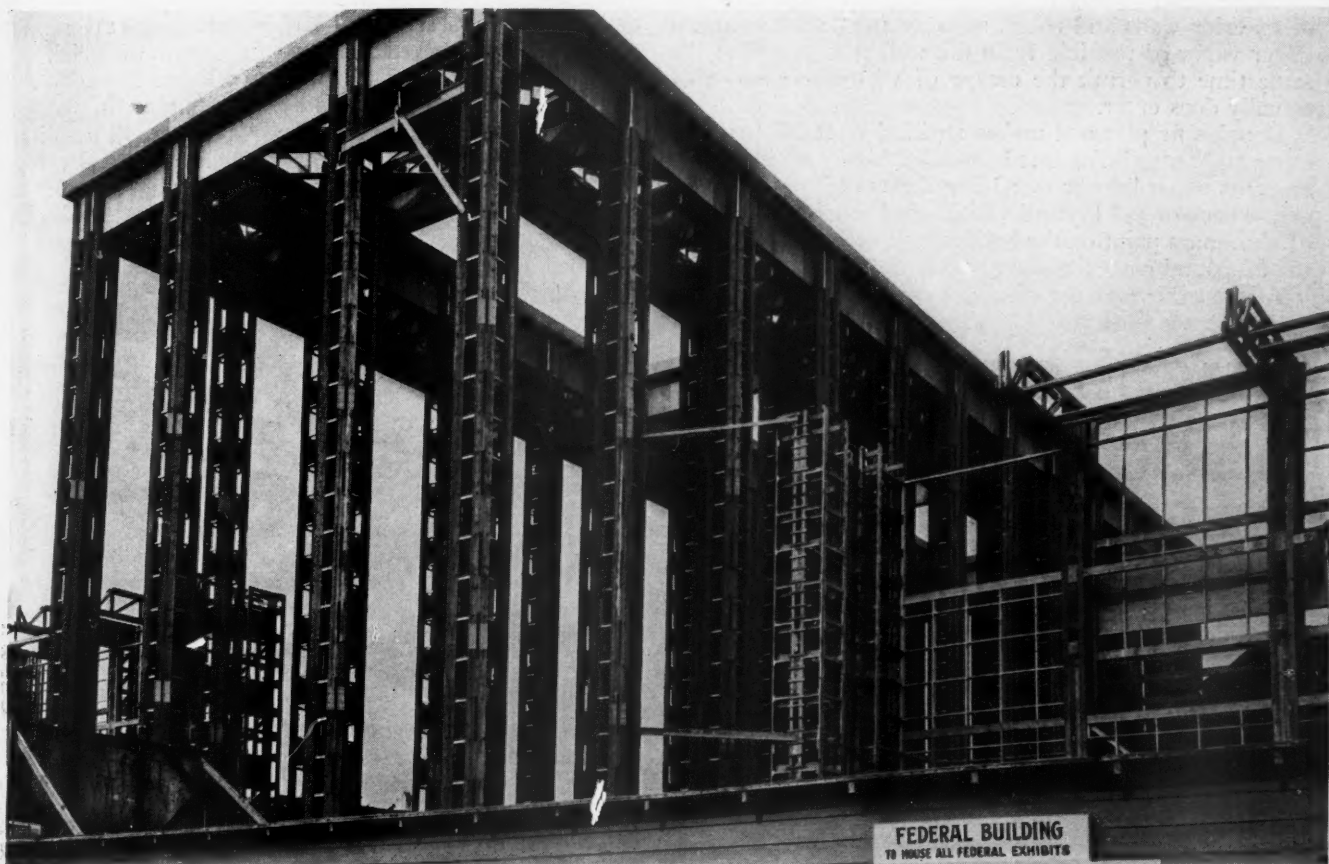
The entire building is faced with 7/16-inch 5-ply Exterior type Douglas fir plywood. The structure is laid out in four-foot squares to receive the 48-inch by 96-inch boards. The plywood is shiplapped all around, resin-sealed at the factory, and nailed with double headed nails to make demolition and salvage easy.

The exterior is painted in high color with a resin vehicle paint which dries with a flat finish and against which the lighting schemes may diffuse in all their glory, without reflection.

The effect is magnificent. There can be no doubt as to the statement that San Francisco, '39, will make us "plywood conscious."

Plywood as a Vapor Barrier

WHERE condensation may develop in walls or roof spaces vapor barriers should be used. Condensation problems occur during cold winter weather in buildings of standard construction where humidities are maintained in excess of 35 to 40 per cent, and where highly efficient insulating materials are used at even lower humidities. Two coats of asphalt paint on the back of Douglas fir plywood interior wall paneling or a layer of asphalt coated and impregnated sheathing paper weighing 50 pounds per roll of 500 square feet applied to the studs and ceiling joist below the roof before applying the plywood makes a highly effective vapor barrier at very low expense according to tests made at the Forest Products Laboratory, Madison, Wisconsin.



COLONNADE OF STATES portion of the Federal Building, San Francisco Fair, where the 48 gigantic columns will reach more than a hundred feet in the air. They are built up of timber posts, arranged in crosses and bound together with thick plates of Douglas fir plywood, EXT-DFPA grade, placed on the edge.

Complaints of moisture damage to walls and roofs, due to condensation within the walls, became acute several years ago, and prompted a series of tests at both the U. S. Forest Products Laboratory and the University of Minnesota.

The findings corroborated long practical experiences of the paper mill industry, that the way to prevent warm moisture laden air; i.e., water vapor, from passing into wall or roof cavities and condensing against the cold outer sheathing or paper, was to provide a *vapor barrier* at the inner surface.

The laboratories went much further, investigating all commonly used wall materials such as plywood, lath and plaster and the like, as well as building papers, insulation materials, wallpaper, and paint coatings.

Only the two coats of asphalt paint or a good grade of aluminum paint, and the coated building papers seem to prove very effective as vapor barriers, as far as ordinary wall materials are concerned.

Strangely, a single coat of asphalt paint isn't good enough, even on a smooth, dense surface such as plywood; it seems to require a second coat to form an impenetrable film on the surface. "Exterior" plywood, with a synthetic resin glue line, is somewhat more effective, because although strictly impenetrable from water, such plywood does permit water vapor to permeate, thus indicating it to be an ideal material for exterior siding and wall covering.

Condensation in house walls is not a factor in moderate weather, and seems to cause the most trouble where air-conditioning units are supplemented with weather-stripping and efficient insulation; the vapor inside can not escape through cracks at doors and windows and so penetrates the wall. Further, the insulation keeps the outside sheathing colder, intensifying any condensation tendency.

Vapor barriers should be used only on the warm side of exterior walls and roofs, in order to exclude as much water vapor as possible from the wall spaces, and at the same time to permit the escape of whatever vapor that actually does enter.

Douglas fir plywood makes an ideal material for both inner and outer linings. It becomes a highly effective and low-cost vapor barrier by adding 2 coats of asphalt paint on the back of $\frac{1}{4}$ " Plywall (Wallboard grade). Two coats of aluminum paint on the back are also effective and so is the 50-pound coated asphalt paper previously mentioned.

At the same time the standard Plyscord $\frac{1}{8}$ " Sheathing

on the exterior face of the studs, although air-tight and water-tight, will permit the water vapor to permeate through it slowly, yet sufficiently to prevent condensation in most instances.

To summarize, if a vapor barrier is needed, put it on the back of the interior plywood, as described in the first paragraph, and use unpainted plywood sheathing with the desired siding or other surfacing for the exterior.

Uncle Sam Uses Plywood

THE introduction of a thoroughly waterproof plywood—designated in the Bureau of Standards specifications as "Exterior" has found an important place in the construction of U. S. Coast Guard stations. Heavy fogs, dashing salt spray, and driving rains have these buildings thoroughly wet a great part of the time, while the untempered rays of the hot summer sun beat down upon them for long periods, but these rigid structures are built to stand these tests. Witness the U. S. Coast Guard station at Eaton's Neck, Long Island, New York. During the devastating hurricane of September 21st that swept away almost every building in its path, this partially completed station stood firm. A gale with a velocity of 90 miles per hour had no effect on it.

Perhaps the greatest specifier of plywood is the public Buildings Branch of the Procurement Division. This is the agency which guides the plans and specifications of the Federal Government's buildings. The very fine effects which are obtainable on both interiors and exteriors with smoothly finished concrete are extending to increasingly greater areas of these Federal buildings.

Where smooth finishes are required the specifications usually describe the desired characteristics of the finished job, for by law no exclusive type of form material can be called for; still by the law of economics it follows in practically every case that Douglas fir "Plyform" is used, and it is safe to say that the larger contractors are rapidly accepting this as the standard concrete form material.

The Department of Agriculture's Farm Security Administration is a large consumer of Douglas fir plywood in the erection of various kinds of shelters and buildings. Its experience with plywood comes quite naturally inasmuch as the Resettlement Administration, now under the Farm Security Administration, had a great deal of first hand experience with the product on numerous projects, and has to its credit a group of experimental houses constructed at Greenbelt, Maryland.

Questions and Answers About Douglas Fir Plywood

Where can I buy plywood?

Any progressive lumber dealer or distributor either carries a stock of plywood or can quickly secure it through his regular source of supply.

Is Douglas fir plywood marketed through exclusive dealerships?

No! Any lumber dealer can secure a stock of plywood for resale to builders, contractors and consumers generally.

What are the advantages of "Dri-Bilt with Plywood" Construction?

Briefly, Dri-Bilt assures that no excess moisture will be introduced in the construction of a home, recognizing that 1000 gallons of water are used in building an ordinary six-room house with conventional interior wall

covering. Since premium lumber for use in framing a house is today kiln-dried to reduce the hazard of shrinkage, warping and twisting after the house has been finished, it seems logical to use plywood's Dri-Bilt principle for interior finish and eliminate the 1000 gallons of water. (See article on Dri-Bilt in this same issue for additional details.)

Is a Douglas fir plywood available which is suitable for marine construction, or for permanent exterior use, or for use where conditions of extreme humidity apply, such as would be encountered in the tropics?

A special type of Douglas fir plywood which is grade-marked and trade-marked "EXT-DFPA" and is known as EXTERIOR plywood has a waterproof glue-line and will not delaminate even under these severe conditions.

Is plywood accepted by the FHA?

Revised General Ruling No. 61 and General Ruling No. 67, June 29, 1937, Technical Division, FHA state acceptance of $\frac{1}{4}$ " Douglas fir plywood for interior finish and $\frac{5}{16}$ " PLYSCORD for wall and roof sheathing and $\frac{3}{8}$ " PLYSCORD for sub-flooring. Following promulgation of the revised Douglas Fir Plywood Commercial Standard CS45-38, EXTERIOR plywood was accepted for permanent exterior use with certain structural limitations.

Are there differences between the faces and the backs of the different grades of plywood?

In some cases there are and in some cases there are not. For instance, Plypanel can be secured in three different classifications; i.e., Good-2-Sides, where both the face and the back are the same high quality of veneer; Good-1-Side, which has a "Good" face and a "Sound" back; and, Sound-2-Sides, which has both a face and a back of "Sound" quality veneer. PLYWALL, the wall-board grade, has a "Sound" face and a "Utility" grade back. PLYSCORD, the sheathing grade, has both a face and back of "Utility" veneer, but the face is of slightly better quality.

What do you mean by "Good," "Sound" and "Utility" faces?

A "Good" face is the highest grade of veneer, made in one piece of 100 percent heartwood; a "Sound" face is smooth and free of knots, splits and checks, although neatly made patches and shims are permitted; "Utility" face may contain sufficient defects, such as knots, splits or pitch pockets, so as to render it unfit for patching but which do not affect the strength of the panel.

Where can I secure information about methods for finishing plywood and suggestions for joint treatment?

Several booklets and bulletins dealing with these subjects in detail are available at the Douglas Fir Plywood Association, Tacoma Building, Tacoma, Washington.

What about plywood and the vapor barrier problem?

This is covered in detail in a special article in this issue. Briefly, two coats of asphalt paint on the back of Douglas fir plywood interior wall paneling or a layer of asphalt coated and impregnated sheathing paper (weighing 50 lbs. per roll of 500 square feet) applied to the studs and ceiling joists below the roof before applying the plywood makes an effective vapor barrier at low expense, according to tests made at the Forest Products Laboratory, Madison, Wisconsin.

What grade of plywood should be used as wall covering?

For wall covering (assuming that only one face is exposed to view) the Good-1-Side classification of PLYPANEL, or PLYWALL, the wallboard grade, in the $\frac{1}{4}$ " or $\frac{3}{8}$ " thicknesses are to be preferred. Where a natural finish, or a light stain finish is to be used, and an especially beautiful job is desired, PLYPANEL, Good-1-Side, should be specified. For painted finish, for base for wallpaper, or where a few neatly made patches are not objectionable in the natural or stained finish, PLYWALL may be specified.

Can you give more detailed information about the use of PLYFORM for concrete forms?

A booklet "Concrete Forms of Douglas Fir Plywood" which gives technical data on this subject is available at the Douglas Fir Plywood Association upon request.

Is Sound 2-Sides (PLYPANEL) satisfactory for Concrete Form work?

Absolutely no, where several re-uses are desired!

What should be specified?

PLYFORM, the Concrete Form panel grade with the special glue line designed for repeated re-use (actual job records of fifteen and more re-uses are frequently reported). The exterior type of Plywood (grade-marked EXT-DFPA) with the permanently waterproof glue line may also be specified for unusually severe service.

Is it ever good practice to use PLYSCORD Sheathing or $\frac{1}{4}$ " PLYWALL for form work?

Yes, if forms are to be used only once. For example, $\frac{5}{8}$ " PLYSCORD for basement wall can later be used for sub-flooring, and $\frac{1}{4}$ " PLYWALL as a smooth form liner is excellent for curved surfaces, and one-story jobs too small for repeated re-use.

Do you have house plans available showing how plywood should be used?

Details are available showing how plywood can be adapted to any type of house construction, but no specific house plans are distributed by the Douglas Fir Plywood Association. Specific house plans, with plywood details, may be secured from The National Plan Service, 1315 West Congress Street, Chicago, or through secretaries of lumber dealers associations.

Are plywood "dealer helps" available?

Dealer helps, including newspaper mats of various plywood objects, electros, envelope stuffers and other basic literature are available through the Association or upon application to any of the plywood Association members.

How does Plyscord for sheathing and sub-flooring compare in cost to conventional sheathing and sub-flooring materials?

Actual price per square foot of Douglas fir plywood varies in different sections, but considering the potential savings in labor costs, in material costs and in job time through the use of plywood, savings from 25 to 50 percent in total sheathing and sub-flooring costs may be expected. Since the large 4' x 8' panels make for quicker installation, labor costs are lowered; since cutting and fitting is minimized, material waste is less; and, since overall job time can be cut materially, additional savings can be effected.

What technical information and assistance is available to the builder, architect, or contractor?

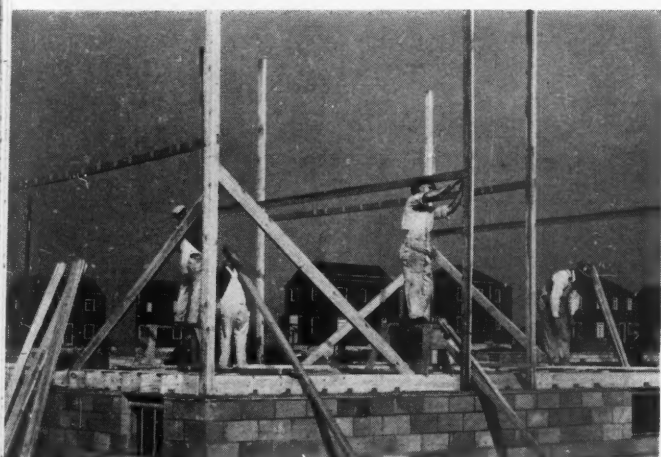
Technical studies of plywood have been conducted from time to time over a period of several years at Government testing laboratories and at various universities, including the U. S. Forest Products Laboratory at Madison, Wisconsin, Stanford University, the University of Washington, and Iowa State College at Ames, Iowa. Such studies will continue to be made as the need arises. In addition, research is carried on regularly at the Association laboratories and the laboratories of the various member mills. These facilities, and the facilities of the Association's engineering department, are always available for consultation on any technical plywood problem.

Can assistance in solving plywood problems in the field be secured?

Three representatives of the Douglas Fir Plywood Association, located in New York City, Washington, D. C., and Los Angeles, are also available for technical advice regarding the proper use of Douglas fir plywood.



PART of first group of 300 homes in 1,200-house industrial housing project for steel workers at Clairton, Pa. Gilbert and Varker, builders.



ABOVE—Erecting steel ribbon—the first step in framing Gilbert and Varker houses. BELOW—A crew of two carpenters and a helper completely enclose exterior walls and roof of house with Douglas Fir "Plyscord" sheathing in 7½ hours.



Ten Houses a Day

Gilbert and Varker Establish Fast Production Schedule in Erecting Plywood Homes for Steel Workers at Clairton, Pa. Plywood Used for Exterior and Interior Walls in 1,200-House Project. Steel Sill and Ribbon Used.

By JOSEPH B. MASON

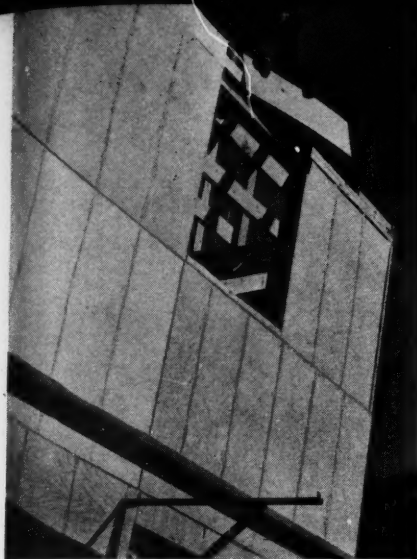
Eastern Editor, American Builder

ONE of the most significant and important mass housing projects in the country today is the 1,200-house project at Clairton, Pa., now in full swing by Gilbert and Varker. It is important because it is the first big industrial housing projects in the country being operated under Section 210 of the Federal Housing Act, which permits the houses to be either rented or sold.

Royce W. Gilbert and William A. Varker are both engineers with a long and respected experience in engineering and large building operations. For years, however, they have been interested in small home construction and have conducted exhaustive tests on methods to improve residential construction and lower costs by mass production methods.

Important among the many innovations in the Clairton project is the use of plywood for exterior wall and roof sheathing and for interior walls. The plywood is delivered to the job precut to certain specified sizes. On the exterior, 5/16-in. "Plyscord" sheathing is used. Two carpenters and a helper apply the entire exterior wall and roof sheathing in from 7 to 8 hours. There is practically no cutting of plywood on the job, and the enclosing of the house consists merely of the very rapid nailing of the sheets into place. There is no waste material. Gilbert and Varker are now working on the perfection of an electric hammer to do the nailing.

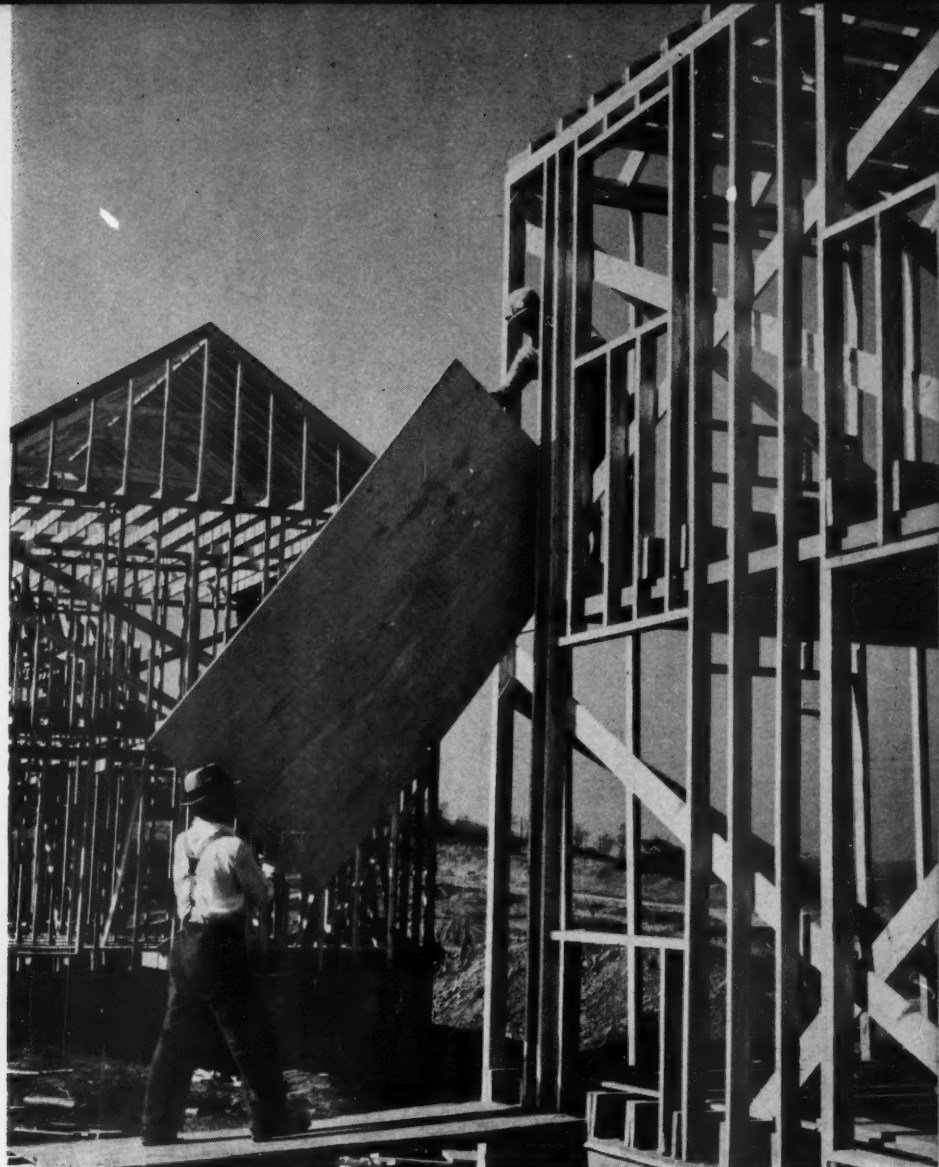
Interior walls are covered with ¼-in. Douglas Fir "Ply-wall" wallboard which is also precut into various sized panels



FITTING THE LAST PIECE of "Plyscord" sheathing into place on a Gilbert and Varker house. Location of standard plywood sheets was carefully worked out and sheets cut in advance, eliminating waste and saving time.



BUILDERS IN A BIG WAY—V. B. Shepard (left), R. W. Gilbert (center) and W. H. Varker of the firm of Gilbert and Varker, see large market ahead in industrial housing as they study model of Clairton project.



QUICK ENCLOSURE, sturdy construction made possible by use of plywood. Slightly more than 2,000 feet of exterior "Plyscord" sheathing are used in a typical Gilbert and Varker house. Sheets come to job pre-cut and are nailed in place with maximum speed.

which can be nailed in place without any further cutting on the job. Over the interior plywood a finish material is applied consisting of a heavy felt-base wall covering with a smooth, tough and washable surface. This wall covering, which was developed and patented by Gilbert and Varker, is applied like wallpaper and given the name "Monocousec." It comes in six different colors. The surface may later be repainted or covered with wallpaper. In addition to providing a tough, washable wall surface, the heavy felt base adds warmth and reduces the resonance of the wall. It also has a desirable acoustical effect, making the whole house more quiet.

Plywood was selected by Gilbert and Varker after a thorough test of its qualities and strength. Their tests have shown the 5/16-in. "Plyscord" sheathing to produce a rigid construction 40% stronger than diagonal sheathing. Once the carpenters had become familiar with handling the material they were able to apply it at a very rapid pace.

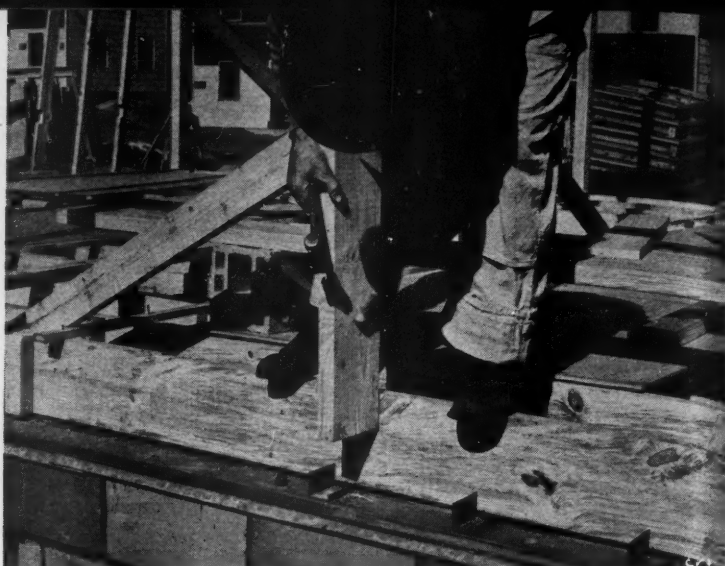
Before placing the order for the plywood, which was one of the largest single orders ever placed for this product for residential construction, totaling over a million and a quarter feet, Gilbert and Varker carefully detailed its use in the houses. A typical sketch of the side and end of one of the houses is shown with this article, indicating how the panels were laid out according to pre-determined sizes to eliminate waste. Each panel unit was

given a number to guide the carpenters in nailing it in place. Under this system both waste and cutting on the job are completely eliminated. A similar plan has been used with all the lumber and framing in the houses—it is completely cut in advance on power saws, and all the required framing material for a house delivered on one truckload. This and other features of the construction methods will be described in later articles.

An important new development in the Gilbert and Varker homes which has a bearing on the precision methods employed is the use of steel sills and ribbons. The same type of metal plate with brackets into which the studs fit is used for both the sill plate and the ribbon. The brackets welded to the plate on 16-in. centers act as guides for the studding. These metal plates and ribbons serve as a template to insure exact dimensions at all points. The pre-cut studs are merely slipped into place in the brackets, as indicated in the accompanying photographs and detail drawings, and quickly nailed into place.

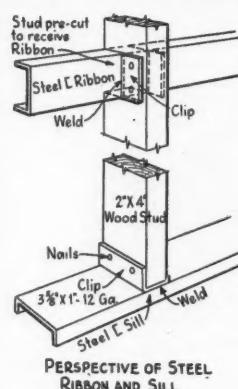
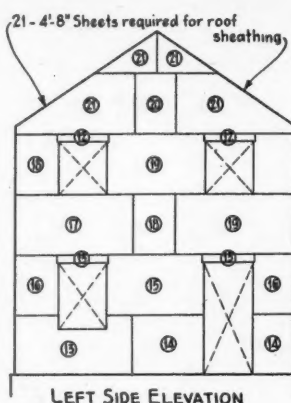
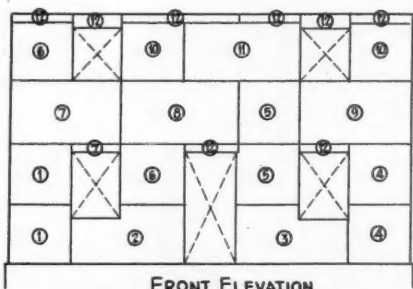
The steel ribbon is notched into the studding at the second floor level. The use of metal at this spot tends to decrease the effect of shrinkage, according to Gilbert and Varker. The framing method employed is one that tends almost entirely to eliminate shrinkage. It is a modified balloon frame construction with 4 by 4 corner posts.

Once an accurate placing of all studdings has been



STEEL SILL PLATE and ribbon with nailing flange for studs provide accurate spacing and more rapid assembly. AT LEFT, carpenter is seen nailing steel ribbon notched into 4 x 4 corner post. AT RIGHT, carpenter is seen fitting stud into nailing flange on steel sill plate.

TYPICAL ADVANCED DETAILING of plywood panels in Gilbert and Varker house. Panels are numbered and delivered to job.



DETAILS OF STEEL SILL and ribbon used by Gilbert and Varker, which acts as template assuring precision construction.

APPLYING 5/16" plywood sheathing to roof.



secured by the steel plates and ribbons it is possible to do many things with closer tolerances than is ordinarily possible, particularly in view of the fact that all of the lumber is pre-cut on electric power saws to exact size. An important feature in this precision method is the quickness and accuracy with which the plywood panels can be applied. Another important feature is the accuracy with which the plumbing, heating and wiring can be detailed in advance and then installed without damage to the structural members.

As a result of the careful advance planning and the scheduling of the work, construction has gone ahead at an extremely rapid pace. More than 200 houses were in various stages of construction when the *American Builder* editor visited the job early in November, and the houses were going up at the rate of ten a day. It is hoped that the entire first section of 300 homes will be completed early in 1939.

The speed with which the houses can be enclosed, and the elimination of delays in plastering, are important in reducing construction costs, overhead and carrying charges.

Other important new ideas and methods employed by Gilbert and Varker in this significant industrial home project will be described in later articles in *American Builder*. Some of these innovations include the use of pressed steel stairs, steel cabinets in place of closets, prefabricated windows with exterior and interior metal trim, placing basement floors at the same time as foundations, use of porcelain enamel cornices, shutters and exterior trim.

GRADE USE GUIDE

Douglas Fir Plywood, Manufactured and Graded Under Rules and Supervision of Douglas Fir Plywood Association, Tacoma

Inspection

The manufacture and grading of Douglas fir plywood is supervised by the inspection department of the Douglas Fir Plywood Association. This insures a uniform high standard of Douglas fir plywood from all manufacturers who are members of the association.

As the plywood comes from the mill, each piece is rigidly inspected by expert graders and placed in its proper quality class. The work of these graders in association mills is checked currently by official association inspectors, to assure that each mill grades its plywood uniformly in accordance with published association rules (U. S. Department of Commerce, Revised Commercial Standard CS45-38). Their chief duty is to see that a high standard of grading and inspection is maintained. The inspectors furnish daily reports to the mill superintendent and to the association, on manufacture and workmanship as they affect grades.

An official inspection certificate which certifies that the plywood from the association mill has been inspected and found to comply with the grade specifications of the association grading rules (U. S. Department of Commerce, Revised Commercial Standard CS45-38) is furnished where requested and can be obtained by buyers so specifying from any manufacturer who is a member mill of the Douglas Fir Plywood Association.

As an additional protection for ultimate consumers and distributors, all standard sized panels of Douglas Fir Plywood are trademarked with the Association initials, DFDA, and also stamped or branded (See facsimiles reproduced on previous pages) with a copyrighted grade name or symbol to identify the exact grade.

In addition, all EXTERIOR Plywood is marked EXT, to identify it as such, and all PLYSCORD sheathing carries the symbol "M.Res." to identify it as moisture resistant, as defined in the U.S. Commercial Standards CS45-38 for Douglas Fir Plywood.

Recommended Grades of Douglas Fir Plywood

Grade Names Refer to Standard Grading Rules of Douglas Fir Plywood Association and to U.S. Commercial Standards, CS45-36

1. Buildings, Light Framed or Light Joisted Construction, Rough Carpentry

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Walls and Partitions		
Sheathing	Plyscord or Plywall (unsanded)	5/8", 3/8", 5/16" 9/16", 7/16"
Floors and Roofs		
Subflooring	Plyscord or Plywall (unsanded)	5/8" 9/16", 7/16"
Roof Sheathing	Plyscord or Plywall (unsanded)	5/8", 3/8", 5/16" 9/16", 7/16"
Roof Decking, Flat Covered	Plyscord Plywall (unsanded) Plypanel SO2S (unsanded)	5/8" 9/16" 3/4" or more
Cellar and Attic, Treads and Risers	Plywall or Plypanel SO2S	5/16" 5/8"

2. Buildings, Heavy Framed, Heavy Joisted, or Heavy Timbered Mill Construction, Rough Carpentry

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Plank Decking, Floors and Roofs, Tongued and grooved, or Splined	Plypanel SO2S (milled as desired)	5/8" and thicker
Subflooring	Plypanel SO2S	5/8" and thicker
Partitions (tongued and grooved or splined)	Plypanel SO2S (milled as desired)	5/8" and thicker
Partitions (stud framed)	(For lining, see 1)	
Stair Treads and Risers	Plypanel SO2S	5/8" and thicker
Heavy Shelving	Plypanel SO2S	5/8" and thicker
Roof Trusses		
Gusset Plates	Special Mill Order	

3. Buildings, Framed, Joisted, or Heavy Timbered Mill Construction, Exterior Finished Carpentry and Millwork

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Ceiling (porch)	Special Plyform	1/4", 3/8"
Exterior Wall Panels	Plypanel G1S (Ext.-Dfpa.)	3/8" and thicker

4. Buildings, Fireproofed Construction, Rough and Exterior Carpentry

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Subflooring	Plyscord Plypanel SO2S	5/8" 5/8" and thicker
Roof Decking, Flat Covered	Plywall or Plypanel SO2S or Plyscord	1/2" 1/2" and thicker 5/8"

5. Buildings, Framed, Joisted, Heavy Timbered Mill, or Fireproofed Construction, Interior Finished Carpentry, Millwork and Cabinet Work

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Finished or Top Flooring		
Attics, Closets, Storerooms	Plywall or Plypanel SO2S	1/2" (or 9/16" unsanded) 9/16" and thicker

Covered Floors	Plyscord	5/8"
	Plywall or Plypanel SO2S	1/2" (or 9/16" unsanded) 9/16" and thicker

Finish and Trim

Attic Stair Treads or Step-ping and Risers	Plywall or Plywall SO2S	1/2" 9/16" and thicker
Wall or Ceiling Surfaces or Paneling	Plywall Plypanel G1S	1/4", 3/8", 1/2" 1/4" and thicker
Ceiling, Partition, and Closet Lining	Plywall Plypanel G1S	1/4", 3/8", 1/2" 1/4" and thicker
V-jointed or Other Milling	As Ordered	
If Both Sides Exposed	Plypanel SO2S or G2S	1/4" and thicker 1/4"
Ceiling, Beams, Built Up	Plywall or Plypanel G1S	1/4"
Shelving, Light	Plywall or Plypanel G1S	3/8", 1/2"
Shelving, Store	Plypanel SO2S	3/8" and thicker
Counter Tops	Plypanel G1S	1/2" and thicker As desired

13. Stadiums, Grandstands and Bleachers

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Roof Decking	Plyscord Plywall	5/8" 1/2" (or 9/16" unsanded)
Seats and Seat Backs (under roof)	Plyform (specially cut to size)	As desired
Wall Covering (interior)	Plywall or Plypanel SO2S	1/4", 3/8" 1/4" and thicker

19. Billboards and Signs

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Panels	Plywall (Ext.-Dfpa.) or Plypanel G1S (Ext.-Dfpa.)	As desired As desired

21. Concrete Forms

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Boarding and Panels	Plyform	1/2", 9/16", 5/8", 11/16", 3/4"
Form Lining { (one use) (reuse)	Plywall Plypanel SO2S Made Plyform Glue	1/4" 1/4"

27. Studio, Stagecraft, Convention Booths, Cutout Displays

GRADES RECOMMENDED
Plywall or as desired

28. Temporary Fronts

GRADES RECOMMENDED	THICKNESS Commonly Used
Plywall or Plypanel SO2S	1/4" and thicker 1/4" and thicker

Glossary of Terms and Abbreviations

In design, on plans and in purchase specifications, it is convenient to use abbreviations. Terms and abbreviations for Douglas fir plywood are at times somewhat different from those used in lumber and accordingly are presented below:

Abbreviations

G2S.....	Good 2 Sides
G1S.....	Good 1 Side
SO2S.....	Sound 2 Sides
WB.....	Wallboard
S2S.....	Sanded 2 Sides

Glossary of Terms

Centers—See Cores.

Checks—Small splits running parallel to the grain of the wood caused chiefly by strains produced in seasoning.

Cores—A core or center is the innermost layer in plywood construction.

Crossbanding—Veneer used in the construction of plywood with five or more plies. In 5-ply construction it is placed at right angles between the core and faces.

Defects, open—Checks, splits, open joints, cracks, loose knots, and other defects interrupting the smooth continuity of the panel surface.

Heartwood—Sometimes referred to as "heart"—the darker-colored wood occurring in the inner portion of the tree.

Knot holes—Voids produced by the dropping of knots from the wood in which they were originally embedded.

Patches—Insertions of sound wood glued and placed into panels from which defective portions have been removed.

Pitch-pockets—Well-defined openings between rings of annual growth, usually containing, or which have contained, more or less pitch, either solid or liquid.

Pitch streaks—A streak is a well-defined accumulation of pitch in a more or less regular streak.

Sapwood—Sometimes referred to as "sap"—the lighter colored wood occurring in the outer portion of the tree.

Shim—A long, narrow patch not more than $\frac{1}{8}$ inch wide.

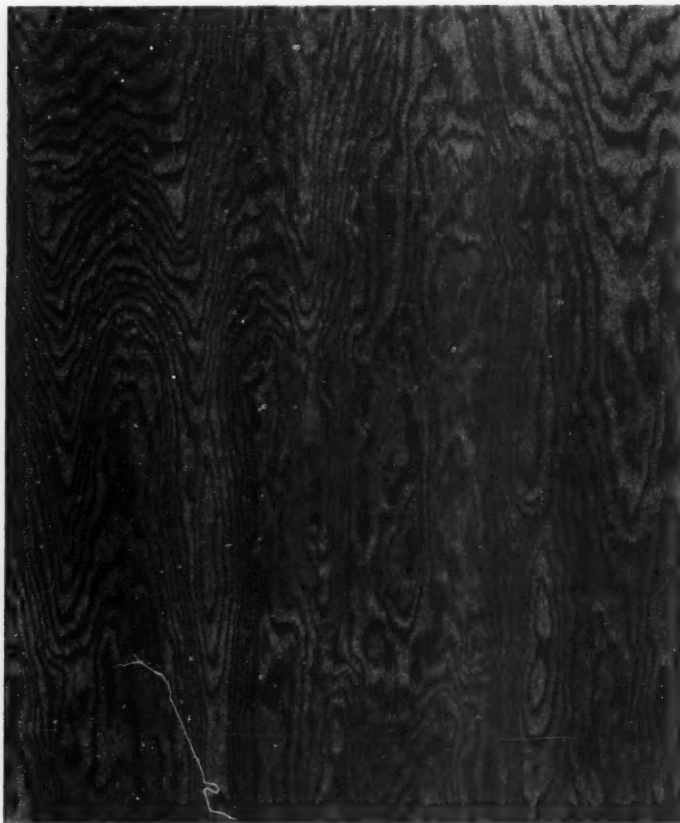


FIG. 1



FIG. 2

Figure 1 shows a typical Good face; figure 2 shows a Sound "face." This particular Sound face consists of two narrow pieces glued side by side; only the variation in grain reveals the perfectly fitted joint. It is intended that above illustrations be representative of the grade, but not necessarily to establish limits.

GRADE PLYPANEL G2S

DESCRIPTION

The highest grade of Douglas Fir Plywood. Faces are in one piece, of 100% heartwood, and are practically clear veneer.

USES

For natural or lightly stained finishes, where both sides of the panel will be exposed to view.

GRADE PLYPANEL GIS

DESCRIPTION

One face is as good as the faces in a G2S grade, while the opposite face or back is a "Sound" face, as described under the next grade.

USES

Also suitable for highest quality of wall paneling, ceiling, partition or other surface where only one face is exposed, or where the back is only occasionally exposed. Light or dark stains, lacquers, waxes, etc., offer a variety of finishes.

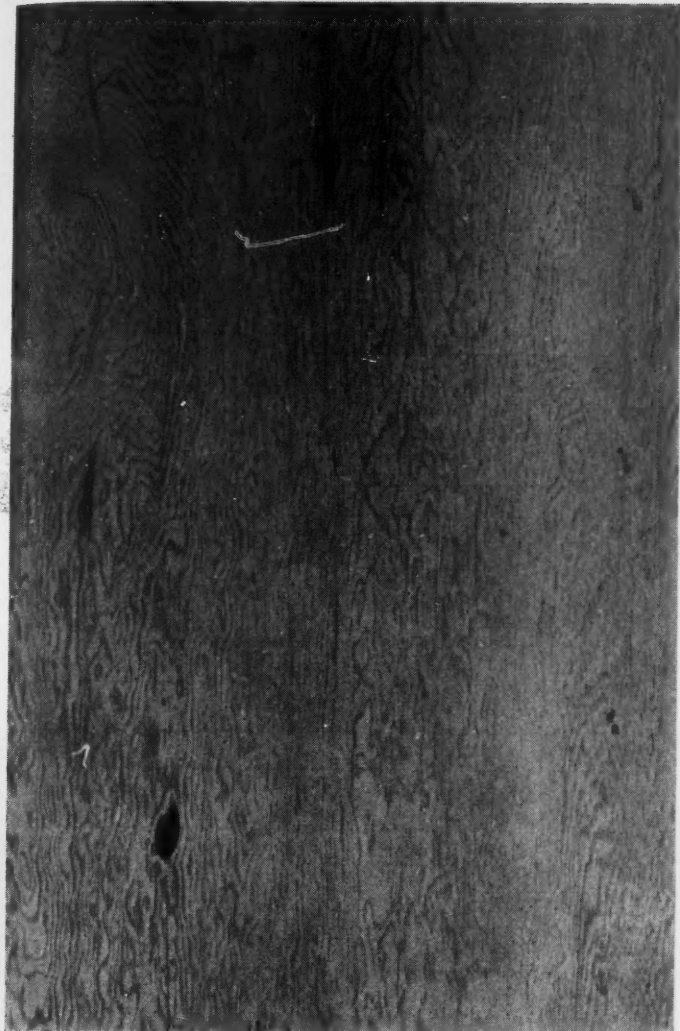


FIG. 3

Figure 3 shows the reverse side or "back," of a typical Plywall grade of panel which has sufficient knots, etc., to prevent economical patching. It is intended that above illustration be representative of the grade, but not necessarily to establish limits.

GRADE	DESCRIPTION	USES
PLYPANEL SO2S	Each face is smooth and free from knots, splits, checks, or pitch pockets. The smooth surface is suitable for painting. Sapwood, streaks or discolorations, shims, and neatly made patches are permitted. Patches and shims are inconspicuous and usually unnoticeable except by the experienced workman in the mill.	For use where both faces of panels are to be exposed (as in booth partitions) and where: (1) Minor blemishes will not be objectionable in a natural or stained finish, or (2) Faces are to be painted.
GRADE PLYWALL	Really a SOUND 1 SIDE panel. One face is equal to the face of an SO2S panel, while the back contains sufficient defects, such as knots, splits, pitch pockets, etc., as to render it unfit for patching.	Probably the most popular plywood grade, where only one face is to be exposed. Suitable for walls, ceilings, partitions or other surfaces that are either to be painted, or papered, or to have a natural or stained finish in which minor blemishes will not be of serious consequence.
Concrete Form Panels	Panels manufactured with special highly water-resistant glues, and designed to give numerous reuses and smooth unblemished surfaces.	For Concrete Forms and where water-resistant service is desired.
GRADE PLYSCORD	Both faces are similar to the back in a PLYWALL grade, except that the face, which is scored for nailing on 16" centers, shall contain no more than 6 knotholes and present a solid surface.	A utility grade, made in 5/16", 3/8" and 1/2" thicknesses, suitable for sub-flooring, sheathing for walls and roofs, or temporary structures where strength and rigidity are required.
GRADE EXT-DFPA	The highest type of Douglas Fir Plywood made, which is strictly water-proof and available in standard grades and sizes.	For permanent exterior uses, marine construction, sign boards, and wherever a water-proof material is required.

TABLE OF SIZES AND THICKNESS OF STOCK PANELS			
Item	Widths	Lengths	Thicknesses
Plypanel	From 12", increasing by 2-in. units to 30"; also 36", 42", and 48"	48", 60", 72", 84", and 96"	3/16" (3-ply sanded 2 sides) increasing by 1/16" thicknesses to 1-3/16" (7-ply)
Plywall	48"	60", 72", 84", and 96"	1/4", 3/8" 3-ply sanded 2 sides; and 1/2" 5-ply sanded 2 sides
Plyscord	48" and 32"	96"	5/16" and 3/8" 3-ply unsanded and 5/8" 3 or 5-ply unsanded

(PLYFORM and EXTERIOR plywood are available in widths and lengths shown for PLYPANEL, PLYFORM in 1/4", 1/2", 9/16", 5/8", 11/16" or 3/4" thicknesses. Larger or odd size panels may be secured on special order.)

Sizes and Thickness of Douglas Fir Plywood

Douglas fir plywood comes in stock panels up to four feet in width and eight feet in length, but larger panels may be obtained upon special order.

In thickness, fir plywood is manufactured from 3/16" (which may be sanded to 1/8") up to 1 3/16" in increments of 1/16". Greater thicknesses as required may be obtained for gusset plates and other special uses.

There is a suitable grade and an economical thickness of Douglas fir plywood for almost any use.

By gluing together the veneer so that alternate sheets have their grain running at right angles, the manufacturer of Douglas fir plywood capitalizes on the strength of wood along the grain.

Along the grain, wood has a tensile strength and stiffness many times greater than it has across the grain. Furthermore, wood has practically no expansion or contraction along the grain.

Consequently, through alternating the grain direction of the veneer sheets, fir plywood acquires longitudinal grain both lengthwise and crosswise and with it great strength and stiffness in all directions. At the same time, the stability of each sheet along the grain, plus the assured glue bond, prevents the adjacent sheets from shrinking or expanding when subjected to heat or dampness, resulting in plywood panels practically immune against expansion or shrinkage.

All stock panels of Douglas fir plywood are manufactured with water-resistant glue.

Concrete Form Panels are made with special water-resistant glues to assure numerous reuses under severe moisture conditions.

Supplementing such plywood products is the strictly waterproof Douglas fir plywood, grade marked EXT-DFPA, and suitable for permanent exterior exposures.

- 3-ply 1/4"
- 3-ply 3/8"
- 3-ply 1/2"
- 5-ply 1/2"
- 5-ply 5/8"
- 5-ply 3/4"
- 7-ply 7/8"
- 7-ply 1 3/16"
- 9-ply (Special to order)

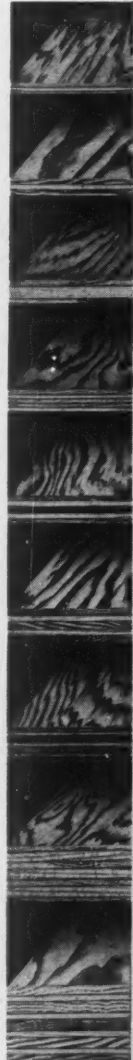


FIG. 4—Representative plies and thicknesses

Structural Data

Bending and Deflection

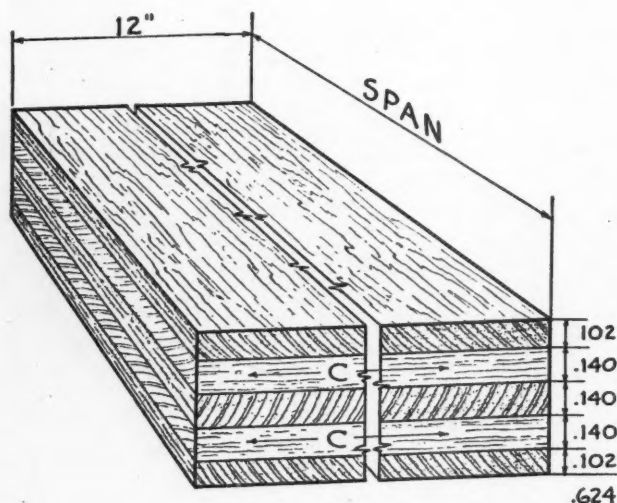
Douglas fir plywood is made from thin sheets or plies of Douglas fir wood, laid alternately at right angles to one another, and bonded together with glues that are stronger than the wood itself. Consequently, for those plies having their grain parallel to the span, the same modulus of elasticity as for Douglas fir lumber is used, e. g.,

$E=1,600,000$ lbs./sq. in.—Numerous tests substantiate this value.

With this value, the deflection of a panel or piece of Douglas fir plywood may be computed readily from the standard deflection formulae.

I , the moment of inertia of the cross-section, however, is computed by considering only those plies that have their grain direction parallel to the span.

In a 5-ply, $\frac{5}{8}$ " panel, for example, assuming it consists of plies shown in figure 12, ignore the two cross-bands, c and c, and hence,



$$I \text{ (for 12" width)} = \frac{12}{12} \left(\frac{5^3}{8} - (3 \times 0.14)^3 + 0.14^3 \right)$$

or, $I = .173 \text{ in.}^4$

If the grain of the face plies runs at right angles to the span then only the cross-bands, "c", would be considered in computing the

$$I = \frac{12}{12} \left((3 \times 0.14)^3 - 0.14^3 \right) = 26 \times 0.14^3 = 0.71 \text{ in.}^4$$

Below is a table of moments of inertia for various thicknesses of plywood. There are minor differences in the thickness of fir plywood veneers used by the various manufacturers, but the values in the table are based on the minimum assemblies and hence are conservative.

TABLE I

(Grain of face plies parallel to span)

Thickness	I (for 12" width)	S
1/4" —(Sanded Wallboard).....	.015	.117
5/16"—(3 equal plies).....	.029	.186
3/8" —(3 plies @ 1/8").....	.051	.270
1/2" —(3 ply).....	.090	.360
5/8" —(5 ply 1/11", 1/8", 3/16", 1/8", 1/11").....	.167	.535
3/4" —(5 ply).....	.250	.667
1" —(7 plies @ 1/7").....	.713	1.426

Based on numerous flexural tests at the University of Washington Forest Products Laboratory, on samples taken at random from practically all the fir plywood mills, the following range of values was obtained:

Modulus of rupture: 8,500 to 15,200 lbs./sq. in.

Fibre Stress at Proportional Limit—6,900 to 9,800 lbs./sq. in.

Tension and Compression

In order to present a general comparative picture as to the strength properties of Douglas Fir Plywood, and other materials sometimes used in its place, the results of a series of tests conducted at the Northwest Testing Laboratory, the Northwest representative of the nationally-known Pittsburgh Testing Laboratory, are summarized below:

In the tension tests, all specimens were 3" x 18"; in the compression tests, 6" x 6" pieces were used. Tests on each material were conducted under exactly the same conditions.

Thickness of material	Tension		Compression	
	Ultimate load	Ultimate stress	Ultimate load	Ultimate stress

LOAD ACTING WITH THE GRAIN OF FACE PLYS

1/4", 3-ply	5250	6484	4198	2855
3/8", 3-ply	5644	4750	6630	2880
1/2", 5-ply	8024	5135	10492	3407
5/8", 5-ply	8132	4350	10644	2893
3/4", 5-ply	8912	4074	18538	4186

LOAD ACTING ACROSS GRAIN OF FACE PLYS

1/4"	2552	3291	908	609
3/8"	4684	4141	5206	2150
1/2"	7664	5108	6462	2162
5/8"	8326	4491	9096	2472
3/4"	8796	3932	15262	3436

TESTS ON OTHER MATERIALS

A-3/16"	1248	2189	390	346
B-3/16"	1276	2180	846	751
C-1/4"	264	352	826	550
D-7/16"	152	126	448	170
E-1/2"	370	248	690	230

Key: Material A, old-style fibre wallboard; B, hard, compressed board; C, plaster-board; D and E, insulating boards.

Sheathing

Tests conducted at the United States Forest Products Laboratory, Madison, Wisconsin, have established that thin Douglas fir plywood is suitable for use as sheathing. The tests on 9' by 14' wall panels indicated that $\frac{1}{4}$ " plywood SHEATHING well nailed to a stud frame was more than adequate in both rigidity and strength. The same kind of plywood glued to a similar stud frame proved to have markedly superior rigidity and strength properties.

5/16" Plywood Suitable as a Shingle Base

Tests completed in the spring of 1937 at the University of Washington's Forest Products Laboratory, under the supervision of Professor Bror L. Grondal, recognized shingle authority, showed that it required a force of 85 pounds (minimum) up to 125 pounds to pull an 8-inch red cedar shingle (one of a panel of shingles applied in accordance with standard practice) from 5/16" fir plywood.

This force is equivalent to a wind pressure of nearly 300 pounds per square foot, a force greater than that of a hurricane. The reason for 5/16" Douglas fir plywood's suitability as a shingle base is that plywood holds the shingle nails with a greater force than that required to pull the nail heads through the shingles.

Professor Grondal, Special Consultant for the Red Cedar Shingle Bureau, and co-author of their Official Handbook, has approved 5/16" Douglas fir plywood as a base for shingles.

NOW, Douglas fir plywood goes further with LAUX

Plywood FINISHES★

Panel 1: I KNOW PLYWOOD IS STRONG, BUT I WANT A PLASTER-LIKE WALL. **USE LAUX Plasterex PLASTIC PAINT—IT LOOKS LIKE PLASTER AND IS FIRE RESISTANT.**

Panel 2: A PLYWOOD WALL IS FINE FOR STRENGTH—BUT WHAT ABOUT THAT JOINT? **DON'T WORRY ABOUT JOINTS... GLUED JOINTS ARE BEST... USE LAUX WATER RESISTANT SELF-BONDING GLUE.**

Panel 3: I'D LIKE A paneled GAME-ROOM IN THE BASEMENT BUT IT'D COST TOO MUCH. **NOT WHEN YOU USE DOUGLAS FIR PLYWOOD SEALED WITH — LAUX Rez AND STAINED**

Panel 4: HOW ABOUT THE NEW EXTERIOR PLYWOOD FOR THIS HOUSE? **FINE AND WE'LL PAINT IT WITH LAUX Rezitex — LOOKS LIKE STUCCO AND IT'S FIRE RESISTANT**

Panel 5: OH, JOHN IT'S SUCH A BEAUTIFUL HOUSE **YES, AND IT COST LESS THAN WE DARED HOPE — AND WILL LAST LONGER — THANKS TO PLYWOOD AND LAUX FINISHING MATERIALS.**

Now there are fir plywood jobbers or dealers in every part of the country who can supply you with the correct Laux paints and finishing materials to complete any plywood job.

With the outstanding advance of Douglas Fir Plywood for use in all phases and types of construction . . . exterior and interior . . . it was necessary to develop a group of materials adapted to Douglas Fir Plywood's very special requirements.

These materials are now presented as a complete line by the Laux Sales Co. of I. F. Laucks, Inc., whose long and intimate association with the plywood industry (as the originator and maker of its water-resistant glues) fitted it uniquely for this responsibility. These LAUX materials have been tried and tested through years of research and actual job tests in co-operation with Douglas Fir and other plywood manufacturers. They are now being marketed by the most progressive plywood distributors and dealers in your area.

Take full advantage of plywood's super-strength, economy and speed, through these modern proven solutions to the old finishing problem. Buy a complete plywood job, at ONE place, with ONE order, with ONE responsibility to back you!

★ PAINTS*—Finishing Materials especially formulated for use on Fir Plywood
*Synthetic Resin-Bound Plastic Paints

REZITEX, fire- and moisture-resistant—tough and elastic wall coating for exteriors

PLASTEREX, fire-resistant, washable wall coating for interiors

REZ, synthetic resin sealer, primer for plywood

LAUX GLUE, proven stronger than nails, water-resistant, self-bonding

JOINT FILLER, SPAX and other finishing materials

TRADE MARK
LAUX

TECHNOLOGISTS TO
THE
PLYWOOD INDUSTRY

I. F. LAUCKS, INC.

SEATTLE • LOS ANGELES
VANCOUVER, B. C.
LOCKPORT, N. Y.
PORTSMOUTH, VA.

NOW you can be sure
of getting the right grade
DOUGLAS FIR PLYWOOD
for each individual job!

**ORDER DOUGLAS
FOR THE GRADE**

• Use Douglas Fir Plywood! It's your answer to scores of building problems. Plywood is cutting costs for builders everywhere—showing them new ways to save time and labor. Yet, with plywood, builders are doing a better job.

You'll find scores of ways that Douglas Fir Plywood will cut *your* costs on any type construction—homes, farm buildings, industrial construction jobs, remodeling. To any job plywood brings the combined advantages of cross-grained lamination, light weight, low cost and the labor saving attributes of large size panels.

And **NOW**—all Douglas Fir Plywood is *grade marked*. This new improvement gives you assurance that you are using the *right grade on the right job*. It speeds identification, cuts handling time.

Get acquainted with these new plywood grade marks. They'll save you money—help you do a better job. Check



• **PLYPANEL** is stamped or branded on the edge of all standard panels and indicates panels Good Two Sides, Good One Side, or Sound Two Sides.

PLYPANEL D.F.P.A.

For Smart Interiors



• Look for this grade mark — **PLYSCORD** — on the corner of each panel of this money-saving sheathing and sub-flooring material. It's also carried with the nailing guide lines on the face of the panels.



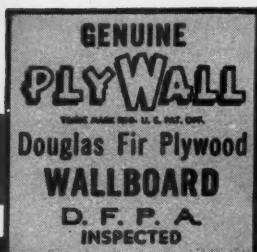
Cut Sheathing Costs with Plyscord



Save Time and Labor on Sub-floors



• Here's your answer to economical remodeling and low cost new construction where walls are to be stained, painted or papered. Use **PLYWALL**—look for the grade mark on the back of all Plywood Wallboard.



Here's Economical Wall Construction



On Jobs Like This—Save with Plywall

AS DE FIR PLYWOOD BY GRADE... AND LOOK MARK ON EACH PANEL...

up today on the advantages of each of these grades.

PLYSCORD, for example, gives you up to 25% or more on sheathing costs. It comes in two standard widths—32" and 48"—to save time and labor in fitting. It has nailing guide lines on 16" centers—nails faster, takes

diagonal sheathing and it makes walls and roofs air-tight, dust-proof, warmer. PLYSCORD is also ideal for sub-floors. It lays faster—gives a smooth, level surface with minimum joints, and is free from cupping.

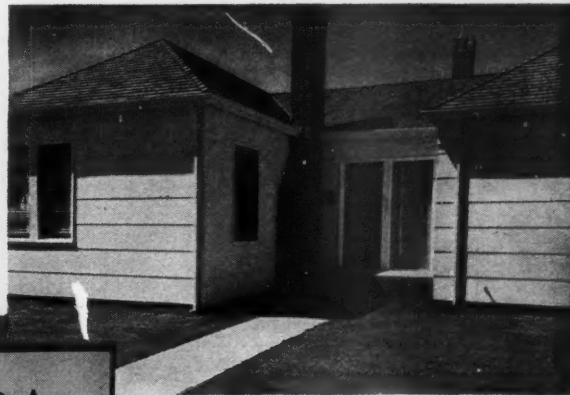
For finer interior finishing—paneling, built-ins, ceilings or other partitions—wherever a stained or natural wood finish is desired—use PLYPANEL. For other interior finishing—for walls which are to be painted or papered, for ceiling and playroom walls, use PLYWALL. It's probably the most popular grade of all, where only one face is to be exposed.

PLYFORM is the grade mark for Concrete Form Pan-

els. These big, easy-to-handle panels give 100% coverage, multiple re-uses, are easy to strip and finally, have high salvage value. For minor form work—such as single house foundations, PLYSCORD can be used and later re-used as sub-flooring or sheathing. But for all major

A special grade of plywood—grade-marked EXT-DFPA—is available for permanent exterior exposures. Panels so marked are capable of passing the severe requirements of U. S. Commercial Standards, CS 45-48, and are strictly waterproof.

As indicated, Douglas Fir Plywood can be obtained in grades for any construction need. Our well-equipped Technical Division offers cooperation in recommending Douglas Fir Plywood to produce the utmost serviceability and economy. Address DOUGLAS FIR PLYWOOD ASSOCIATION, Tacoma Building, Tacoma, Washington.



● PLYFORM is the grade mark for Concrete Form Panels. For house foundations, where repeated reuses are not necessary, Plyscord may be used for forms, and then reused for sub-floors or sheathing. For major form work, be sure to specify PLYFORM.

● For permanent exterior exposures use plywood marked EXT-DFPA. Such panels are waterproof and capable of meeting the requirements of CS-45-38.

FHA ACCEPTED! Plywood is accepted by the FHA for interior paneling, sheathing and subflooring, subject to certain limitations in revised general ruling No. 61 and general ruling No. 67, June 29, 1937, Technical Division, FHA. For interior paneling these rulings specify that the plywood must not be less than 1/4" thick on stud and joist supports spaced not in excess of 16" on center. For wall and roof sheathing 5/16" Plyscord grade is acceptable if securely nailed. For subflooring 5/8" plywood is acceptable when joist spacing does not exceed 16" on center and when adequate cross-bridging is provided. Finally, following promulgation of the revised Commercial Standard CS-45-38 covering plywood (November 10, 1938), exterior plywood was accepted for permanent exterior exposure with certain structural limitations.





Here's the For Wall

**LOOK FOR THIS
DISPLAY AT YOUR
DEALER'S--HE HAS
A STOCK OF NEW**

Embossed
WESTBOARD
PRACTICAL DURABLE ECONOMICAL

DEALERS!

**Washington Veneer Company Adds a Winner to
Its List of Standard Plywood Items**

Put this Embossed Westboard "Silent Salesman" on your front counter. Contractors and builders are looking for new distinctive and inexpensive ideas in real wood paneling. Embossed Westboard is their answer. Use this display and watch your customers' interest. If you don't have Embossed Westboard in stock, or one of these displays, ask your jobber or write us immediately.



Washington Veneer Company's grading, under the supervision of the independent inspectors of the Douglas Fir Plywood Association, is in accordance with the published Association grading rules (U. S. Dept. of Commerce Commercial Standards CS-45-38) and carry the registered grade marks; PLYSCORD, PLYFORM, PLYWALL, and PLYFORM.

Embossed Westboard gives a rich room effect with per finished room economy . . . Embossed Westboard comes in two patterns for a wide variety of pleasing combinations and uses . . . It is easy and economical to finish . . . The warm beauty of natural wood is retained, though large tiring wood grain surfaces are softened by the Embossed Westboard patterns which are actually embossed into the real wood . . . It is not an imitation.

WASHINGTON

OLYMPIA, W

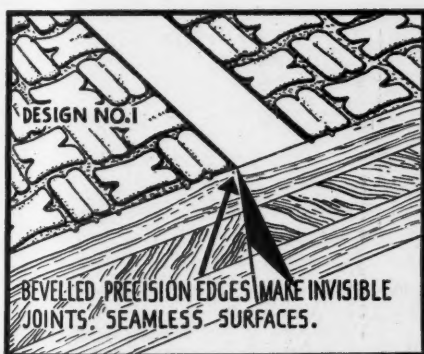
FOR WALLS AND PARTITIONS OF

the Board You Want

ell Paneling

**NO BATTENS
NO GAPPING
JOINTS**

Modern in appearance . . . modern in construction . . . Embossed Westboard is a beautiful wall paneling for modern homes and up to the minute construction . . . yet it has a dignified beauty that will last through the years.



PATTERN No. 1 is a finely embossed woven pattern with $\frac{3}{8}$ " planking effect running vertically and spaced 5", 11", 8", 8", 5" and 11". Every other strip comes on 16" studing center. **NO BATTENS ARE NECESSARY . . .** the beveled precision edges make for beautiful seamless surfaces.

PATTERN No. 2 is a $\frac{1}{2}$ " basket weave design embossed into the panel surface. It harmonizes with design No. 1 and has the same type bevelled precision edges to make seamless surfaces.

Act today . . . investigate Embossed Westboard . . . the modern real wood wall paneling . . . Embossed high grade plywood for modern economical dry-built construction.



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W VENEER CO.
WASHINGTON

LASTING BEAUTY

WASHINGTON VENEER COMPANY,
Olympia, Washington.

I am interested in price information on Embossed Westboard.
My (dealer's name) (jobber's name) is:

NAME.....

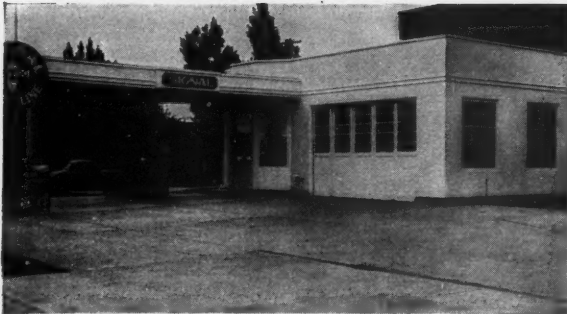
CITY.....

MY NAME.....

STREET.....

CITY.....

Tempered



Illustrated on this page are examples of SUPER-Harbord panels used as exterior covering, showing its adaptability to modern design in the service building field. It is equally suitable for exteriors of practically every building type, and for a wide variety of architectural treatments.

Now, with the new synthetic resin finishes, the design possibilities are further enlarged! As announced on page 101 the trade generally has available from our distributing warehouses, especially developed plywood finishes, including REZITEX, and REZICOTE manufactured by I. F. Laucks, Inc.

Harborside THE SUPER-HARBORD SIDING

HARBORSIDE is outdoor plywood in convenient siding units affording SUPER-Harbord's weather-proof qualities in modern siding material. HARBORSIDE is edge-rabbeted for builders' convenience, comes in easily handled units for modern design and labor economies.



HARBORD PLYWOOD PRODUCTS

Harbord Plywood, Harbord Sheathing, Harbord Wallboard, Harbord Plycrete (For Concrete Forms), Harbord Industrial Plywood, Harbord Lauan Plywood, Harbord Sugar Pine Plywood.

SUPER-HARBORD PRODUCTS

Super-Harbord Plywood (In all grades—in panels as large as 8 x 16 feet), Super-Harbord Plycrete (For Concrete Forms), Super-Harbord Lauan Plywood, Super-Harbord Redwood Plywood, Harborside.

MANUFACTURED PRODUCTS

Harbord Tennis Tables, Sag-Nott Doors (With Cotter-Keyed Joint)



AS METALS ARE TEMPERED

... another exclusive feature of

SUPER-Harbord

THE OUTDOOR PLYWOOD

SUPER-Harbord, the Outdoor Plywood, is tempered in a manner somewhat analogous to the process used in metals. The "drawing" stage of the operation is to relieve the internal stresses in the panel and balance the construction of the unit so that it behaves uniformly in service. This **EXCLUSIVE FEATURE** is in addition to our patented process* which makes it permanently weatherproof.

ONLY SUPER-Harbord is tempered . . . and **ONLY** through this tempering operation is it possible to produce a guaranteed plywood with lineal expansion, due to moisture or temperature changes, reduced to nil—and with the balanced cross-banded construction that will not crack or split.

Exhaustive laboratory tests—thousands of actual service uses under every climatic condition—have proved that SUPER-Harbord is permanently weatherproof. You are cautioned to accept no substitute for SUPER-Harbord. It is edge-branded for your protection. Ask for it by name . . . genuine SUPER-Harbord.



For a weatherproof plywood guaranteed against separation of plies due to moisture or any weathering condition, specify SUPER-Harbord, or "exterior plywood hot-pressed with a cresylic formaldehyde synthetic res'n binder, and then tempered."

Balanced cross-banded construction, **TEMPERED**, prevents cracking or splitting under any moisture or weathering condition.

Edge-branded for your protection . . . look for **SUPER-Harbord** on the edge of every panel of plywood to be used for outdoor purposes.

IT STANDS THE BOILING TEST

Performance Specifications—Exterior Plywood (Nat. Bureau of Standards—Part. 24-2845-38) Boiling test pieces four hours and drying at 145° for twenty hours, plus boiling for four hours, plus testing while wet. Test pieces must show: No delamination, average of least 60% wood failure, and no individual test pieces can show less than 30% wood failure. SUPER-Harbord shows test results far superior to these government requirements.

FOR FURTHER INFORMATION



MAIL COUPON FOR INFORMATIVE NEW BOOKLET

AB

Harbor Plywood Corp.,
Hoquiam, Wash.

Please send a copy of your new booklet, "Information on SUPER-Harbord, the Outdoor Plywood, and other Harbord products."

Name

Address

City State

HARBOR PLYWOOD CORPORATION

Mills and General Offices, Hoquiam, Washington

DISTRIBUTING WAREHOUSES: Atlanta, Baltimore, Chicago, Cincinnati, Cleveland, Columbus, Indianapolis, Jacksonville, Los Angeles, Louisville, Milwaukee, New Orleans, Philadelphia, Pittsburgh, San Francisco, Toledo, Washington, D. C.
REPRESENTATIVES: Billings, Denver, Kansas City, Omaha, Worcester.

SWING THAT JOB WITH

TRU-BILT

Will Stay Sold on the Job ... Gives Entire Satisfaction

Behind every foot of TRU-BILT Plywood is outstanding skill and experience. Using the choicest logs obtainable from the great forests of the Pacific Northwest, every machine and every activity in our plant is tuned to produce a product that in every sense of the word means TRU-BILT—a product designed to give more real value at no greater cost—to stay sold on the job.



TRU-BILT PLYSCORD

The new trade-marked Douglas Fir Plywood sheathing—mill-scored for easy nailing. Cuts application costs as much as 50%; gives more rigidity to walls, is air-tight, dust-proof and makes homes warmer. Available in two widths, 32" and 48"; three thicknesses, 5/16", 3/8" and 5/8".

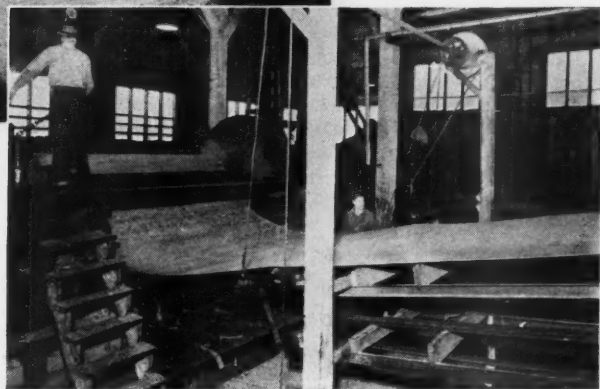
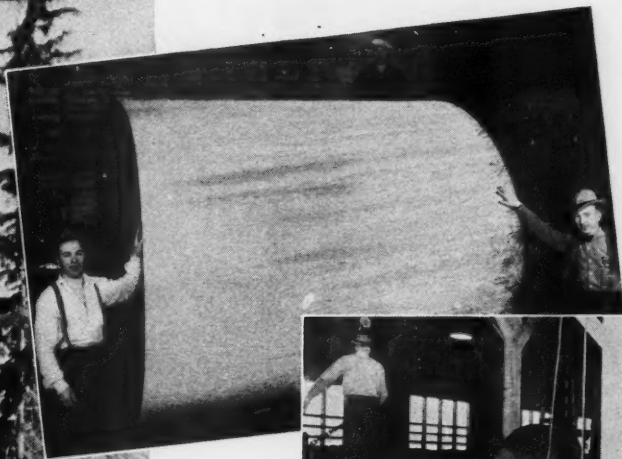
**Tru-Bilt Plywood Products are
Strong, Rigid, Crack-Proof,
Beautiful and T-Square**

**WEST COAST
PLYWOOD CO.** ABERDEEN,
WASH.

It takes REAL TREES to make APCO plywood

To the left you see a giant Douglas Fir log 10 ft. in diameter ready for the peeler.

Below—An endless sheet of ply as it comes away from the lathe in which the giant log is placed.



Superior because: (1) Manufactured from genuine old growth Douglas Fir peeler logs which insures softness of texture and brightness of wood. Only the most select Douglas Fir logs are picked for APCO Plywood products. (2) The plies that make up APCO Plywood are rigidly inspected—only the perfect ones reach the press. (3) Manufactured with water-resistant glue which enhances the versatility of its uses—only the best glues obtainable are used. (4) Enormous production insures prompt and efficient handling of all orders. That is why APCO Douglas Fir Plywood is first choice among the builders everywhere. (5) The following are some of the APCO Plywood products: Fir Wallboard—Fir Panels—Fir Concrete Form Panels—Resin-Bonded Hot-Plate Panels—Plyscord Sheathing—Ponderosa Pine Plywood—Industrial Plywood—Door Panels—Specialty Items.

Dealers—Meet the demand for tennis table tops and bases. "Apco" is easy to stock, easy to sell—their simple, sturdy construction and fine appearance meet instant approval. They can be assembled in a few minutes time without nails or bolts. For information communicate with the home office or any of our representatives near you.



ABERDEEN PLYWOOD COMPANY

Aberdeen,

Washington

RESIN - BONDED LAMINATED DOUGLAS FIR PLYWOOD

Here's a monarch of the forest, 425 years old—
300 ft. high, 127 ft. to the first limb, 10 ft. 10 in.
in diameter.

YOU CAN GET LAMINEX PLYWOOD IN ALL STANDARD GRADES



● The numerous advantages afforded by the use of plywood provide new savings and profit possibilities.

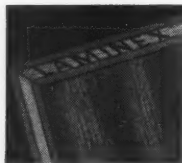
In addition to a complete line of standard plywood, Wheeler Osgood has developed plywood specialties which enable even greater savings and wider applications. They afford distinct advantages, for special uses, which are important to every builder.

LOOK FOR THE LAMINEX TRADE-MARK—all plywood is not LAMINEX. The famous LAMINEX trade-mark is your assurance of complete satisfaction, maximum savings and value. It pays to insist on LAMINEX.

Philippine Mahogany LAMINEX



The aristocrat of plywoods. The striking beauty of true ribbon grain Philippine Mahogany may now be obtained at low cost. Constructed by the LAMINEX process, the beauty of this superb hardwood is combined with the strength and workability of other Wheeler Osgood plywoods. Finish possibilities are almost limitless—any tone from "blond" mahogany to oak may be easily obtained. Philippine Mahogany is used effectively and economically wherever richness and distinction are desired.



All-Weather LAMINEX



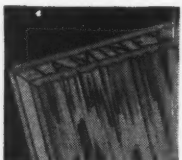
The plywood for exterior use. Produced by Wheeler Osgood's hot plate process, All-Weather Laminex resists shrinking and swelling ordinarily caused by temperature and moisture changes. Resin binder prevents ply separation. Used advantageously in structures and products exposed to the elements. Its glass-smooth surfaces do not dent easily—are exceptionally easy to paint or stain, grain raising and hair checking are minimized. Available in all standard sizes and plies.



Etched Wood LAMINEX



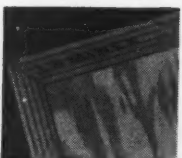
The "different" paneling material, that brings the atmosphere of the forests into the room. Beautiful natural pattern of the wood is brought out in relief by grain etching. Rugged surface of Etched-Wood may be finished in many color combinations and standard wood finishes for homes, cottages, taverns, clubs, etc. Has all the advantages of standard Laminex Plywood. Available in standard sizes.



Plyform LAMINEX



The economical and efficient concrete form material. Wherever lumber has been used for the old method of building concrete forms, Plyform LAMINEX can be used advantageously. Large-sized panels, tight-fitting joints, accurate cutting to size result in smoother concrete surface with a minimum of fins. Bracing is simplified, stripping is easier, handling faster. Plyform Laminex may be re-used many times—is available in intermediate sizes up to 4x8 ft., or larger when specified.



WHEELER OSGOOD SALES CORPORATION

Manufacturers of Laminex Products

Factory: Tacoma, Washington

General Sales Offices: 122 South Michigan Avenue, Chicago, Illinois
New York • San Francisco • Los Angeles • Dallas • Wichita • Tacoma



LOCKTITE

DOUGLAS FIR PLYWOOD

Concrete Forms
Interior Walls
Exterior Walls
Sheathing
Sub-Flooring

Dependable Performance

You can be sure of the quality of LOCKTITE because all the plywood manufactured by us in our two modern mills is graded and stamped according to Douglas Fir Plywood Association standards. There is a grade for every purpose—Each grade manufactured to fill a required need.

You can
save money
by buying



LOCKTITE
D.F.P.A.

graded plywood.



LOOK FOR THESE GRADE MARKS

Stamped on all LOCKTITE Douglas Fir Plywood

Ask your dealer about LOCKTITE

Oregon-Washington Plywood Co.

Two Mills—Tacoma and Everett, Washington

DAILY NEWS BUILDING
CHICAGO
LOS ANGELES

107 PARK AVENUE
NEW YORK
SAN FRANCISCO

LOCKTITE

DOUGLAS FIR PLYWOOD

NATIONAL

PAMUDO PLYWOOD

DISTRIBUTION



FOR YOUR CONVENIENCE

No matter where you are located, you can secure PAMUDO lumber products. Our eight points of distribution are so located that your dealer can be assured of prompt delivery. Our warehouses carry a complete stock of PAMUDO plywood, doors, frames, mouldings, sash, glass and wallboards. Supplementing regular transportation facilities and providing rapid, economical

delivery, PAMUDO owns and operates a fleet of trucks to serve the trade in areas surrounding our warehouses. Prompt, courteous service is assured.

PAMUDO representatives are trained specialists in their field. They are always at your command ready and willing to help you solve your building material problems. Ask your dealer about PAMUDO.

SIX
WAREHOUSES
for-
ORDERLY
DISTRIBUTION
TO THE TRADE

ALSO STRAIGHT OR MIXED CARLOAD SHIPMENTS DIRECT FROM FACTORY

PACIFIC MUTUAL DOOR COMPANY

GENERAL OFFICES — TACOMA, WASHINGTON

PLYWOOD - DOORS - FRAMES - MOULDINGS - SASH & GLASS - WALLBOARD

PAMUDO

★ Waterproof plywood for exterior purposes

Accepted by F.H.A.

Specify

★

RESNPREST

REG. U.S. PAT. OFF.

FOR A DEPENDABLE BOND



Here, Resnprest plywood with batten joints achieves a modern effect.

Resnprest exteriors are accepted by F. H. A. and 312 building codes in major cities. The large, economical panels meet all structural requirements and provide durable weather-proof surfaces especially adaptable to modern flush wall design and streamlined rounded corner construction. The Resnprest bond is not affected by water, steam, heat, cold, termites, fungus, mold.

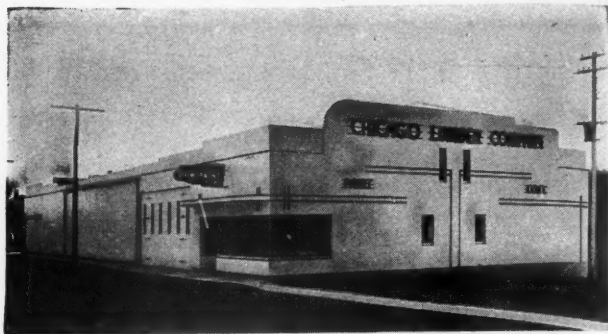
Resnprest is made on largest hot plate plywood press in America. Bonded with phenol formaldehyde (bakelite-type) resin. Available in $\frac{1}{8}$ " to $1\frac{1}{2}$ " thicknesses in sizes up to 72" x 144" sanded and up to 96" x 144" unsanded. Manufactured in rotary cut and vertical grain Douglas Fir and Philippine Mahogany.

For all exteriors, or where moisture is a factor, specify Resnprest.

M and M WOODWORKING COMPANY

KENTON STATION — PORTLAND, OREGON

Manufacturers of Kraftwood, Rezo
Doors, Flush Cupboard Door Stock.



Says L. L. Simpson, vice president, Chicago Lumber Company, "Resnprest has been used with excellent effect in remodeling this and our other yards. We are more than pleased, and predict a bright future for Resnprest." Smooth flush walls without battens were made by using caulking compound in the joints.



AT LEADING JOBBERS

ASK YOUR DEALER OR
WRITE US FOR NEW
FOLDERS ON

- ☐ Modernizing
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SEZ' GLOOMY GUS"
THAT PLYWOOD CUSS:-

A TOAST TO THE DOUGLAS FIR PLYWOOD
INDUSTRY—AND ANOTHER YEAR OF PROGRESS

Kaseno Glues pledge to continue—in diligent research and laboratory work—their unceasing effort to further perfect the bond that binds the laminations of Douglas Fir Plywood into a sheet of building board stronger than steel for its weight.

KASENO
PLYWOOD GLUE

Adhesive Products Co., Seattle

*That's our story - and we're **STICKING** to it*



**THE BEST GLUE
MAKES THE BEST**
Plywood . . .
I. F. LAUCKS, INC.



For over fifteen years I. F. Laucks, Inc. has been developing and supplying superior water-resistant glues to the fir plywood industry. In fact the industry dates its modern growth from the time of the original discovery of highly water-resistant soybean glues in the research laboratories of I. F. Laucks, Inc.

Ever since then this company has kept constantly at the job of improving and adapting Lauxein glues for wider usefulness of plywood . . . in the firm belief that plywood can only be as good as its glue line, and that the **BEST** glue makes the **BEST** plywood.

The present status of the plywood industry and the fine product that it is

now supplying the building world is a testimonial to that Laux standard, and a tribute to the manufacturing intelligence in the plywood industry.

LAUX PLYWOOD FIRSTS

- FIRST with new waterproof glues, specially formulated for fir plywood . . . 1923
 - FIRST with special glues for concrete form plywood . . . 1930
 - FIRST with a self-bonding water-resistant Glue and a system of "dry wall" construction "UNIWALL" . . . 1935
 - FIRST with a low-heat, waterproof synthetic resin hot press adhesive and mastic glues . . . 1936
 - FIRST with a factory primer and sealer for plywood . . . 1937
 - FIRST with fire-resistant synthetic Resin Bound paints for exterior or interior plywood walls . . . 1938
- Casein • Blood Albumen • Synthetic Resin Adhesives

"THE SPANGLED GLUE LINE IDENTIFIES LAUXEIN GLUE"

[Copyright 1934 - I. F. Laucks, Inc.]

TECHNOLOGISTS TO
THE
PLYWOOD INDUSTRY

I. F. LAUCKS, INC.
SEATTLE

World's Largest Makers of
WATERPROOF GLUES
for Every Purpose



A Canadian ACHIEVEMENT In Plywoods Merchandising

B RITISH Columbia Plywoods Limited, leading Canadian plywood manufacturers, has a record of progressive achievement in the merchandising of high grade plywood products for Canadian and overseas markets. Outstanding among these was the introduction of "Vee-d" panels, made at the factory to the buyer's specifications; and also "Mono-dor", a scientifically constructed "slab" door. These and other plywood products are manufactured and wrapped at the factory in tough dustproof packages and marketed under the trademark:

SYLVAPLY

GIANT PANELS OF DOUGLAS FIR PLYWOOD

WALLBOARD • DOOR PANELS

CONCRETE FORM PANELS

GENERAL PANELS

CUPBOARD DOORS of 3/4-inch 5-ply

SHEATHING

Unsanded giant sheets of real lumber (laminated) for rapid, economical and stronger construction.

VEE-D PANELS

Random or plank design, or in large squares for ceilings, or small squares for tile effects.

MOULDINGS

Specially designed for application with plywood.

Designers and Manufacturers of:
Trademark Reg.
Mono-dor

"**M**ONO-DOR", a reinforced lumber core in scientific grid construction, faced both sides with SYLVAPLY, met with instant demand by the retail lumber trade throughout Canada. "Mono-dor", being adaptable to a wide variety of modern designs and finishes, enjoys the enthusiastic interest of those members of the profession of architecture who specialize in the creation of interiors of modern and imposing simplicity.

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LIMITED

VANCOUVER CANADA

Eastern Canadian Offices:
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**DOUGLAS FIR PLYWOOD
"MARCHES ON"**

Plywood's tremendous progress made during the past several years has been the result of scientific precision manufacture—serviceable research—and the refinement of glues to further widen the utility of this versatile building board.

The research staff of the Northwest Processing Company pledge their combined energies and unceasing efforts to meet the challenge of new conditions.

CASEIN
DURALOID
VENEER GLUES

SYNTHETIC
RESINWELD
RESIN GLUES

GEORGE H. OSGOOD

NORTHWEST PROCESSING COMPANY
TACOMA, WASHINGTON

EXTRA

"HARBOR" Provides
"the finishing touch"
 for

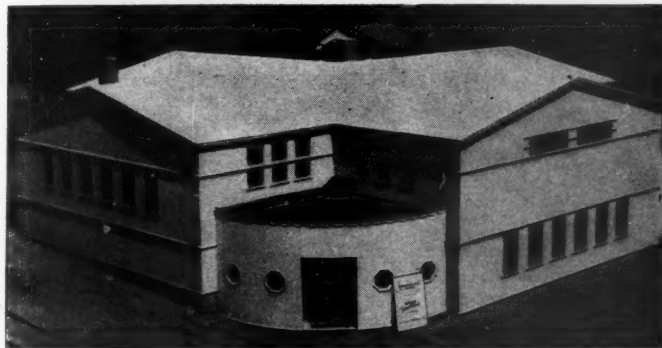
HARBOR PLYWOOD
SUPER HARBORD...

PLASTEREZ FIRE RESISTANT **PAINT**

for interior plywood

REZITEX FIRE RESISTANT **PAINT**

for exterior Super Harbord



Typical Job, REZITEX on SUPER HARBORD
 All-Plywood Gym, White Salmon, Wn.

● We are proud to announce our distribution throughout the principal market areas of the U. S. of these two new fire-resistant synthetic resin paints for exterior and interior plywood . . . as well as a complete line of plywood accessories: special plywood sealers, joint fillers, glue, etc. . . all manufactured by that internationally-known firm of research and manufacturing chemists, I. F. Laucks, Inc.

Successful jobs everywhere testify to the beauty and permanence of these paints and finishing materials, which provide matchless beauty in addition to the well recognized economy, strength and speed of Harbor Plywood construction.

Contractors . . . inquire of your Harbor Plywood dealers . . . or any one of 22 strategically located Harbor Plywood distributors . . . for this complete plywood service . . . one responsible source for all or any part of a complete, satisfactory, plywood job.

HARBOR PLYWOOD CORPORATION

Mills and General Offices: Hoquiam, Washington

Distributing Warehouses: Atlanta, Baltimore, Chicago, Cincinnati, Cleveland, Columbus, Indianapolis, Jacksonville, Los Angeles, Louisville, Milwaukee, New Orleans, Philadelphia, Pittsburgh, San Francisco, Toledo, Washington, D. C. Representatives: Billings, Denver, Kansas City, Omaha, Worcester.

ROBIN BRAND Products
 From the COMPLETE Douglas Fir Mill



SELL
SATISFACTION
 and KEEP your
 customers SOLD

SASH

that is 100% clear, vertical grain, heartwood. Unconditionally guaranteed for the life of the house!

DOORS

of 100% heartwood Douglas Fir—rot-proof by nature. A reputation for long life of trouble-free service.

LUMBER

Dimension, flooring, ceiling, siding, stepping, moulding, finish, casing and base—all of unexcelled Douglas Fir.

PLYWOOD

"Plyform" concrete form panels. "Plywall" wallboard. "Pliscord" for sheathing and subfloors. "Plypanels" and "Plywall" with the new V. G. face for fine interior finish.



ALL ROBIN BRAND PRODUCTS
 are made in our own plant. They are noted for enduring good service because they are precision manufactured exclusively from Long Life Douglas Fir.

ROBINSON MANUFACTURING CO.
 EVERETT, WASHINGTON
 "Since 1902"

Hank

Sez:

**As How We
Burnham
Folks**

**Don't Climb In No Window
When You Ain't Lookin**



Now and again—once every 5 years or so—some feller what has his eye teeth cut, asks us where we stand on standing back of dealers.

Meaning, do we help him make sales with our left hand, and hinder him making 'em with our right?

Well, whatever he means, there's only one meaning to the way our Burnham folks help.

They help you dealers with *both* hands.

All our boilers, radiators and what have you, are distributed through wholesalers.

No climbing in any window to make a sale behind your back when you're not looking.

That's the way we been doing business for close to half a century and it's too late now to begin doing it any other way and keep friends with you, good friends.

So you can leave any window unlocked you want ter and feel safe as if in church.

Hank Hinder

BURNHAM BOILER CORPORATION
Distributed Through Wholesalers
Irvington, N. Y. Zanesville, Ohio
Branch Offices in All Principal Cities
Export Department: 50 Church St., N. Y. City

Burnham Boiler



TAKE THE SHORT CUT TO PROFITS! ... SAW 10 TIMES FASTER WITH **SKILSAW**

SKILSAW will cut your sawing costs in half . . . it will enable you to out-bid and out-perform your competitors . . . to get more jobs and make more money!

For 18 years, since we introduced the first portable electric handsaw, SKILSAW has been the choice of progressive builders everywhere. It has more power . . . more construction refinements . . . more sawing applications. Works from any light socket. Cuts wood, metal, stone, compositions. 9 Powerful Sizes.

SKILSAW, INC.

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• Sold by leading distributors of mine, mill, hardware and contractors' supplies.



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TRAINED men needed NOW who know blue prints, specifications, estimating, etc. Can you lay out and run jobs from plans? We teach you quickly to make the REAL money TRAINED men now command.

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Test the famous C.T.C. "Blue Print" Way to get into the real money brackets in Building. Send today for our FREE BOOK.

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Get this Free Trial Lesson now! Prove to yourself how easy it is to learn Plan Reading, Specifications, Estimating, Superintending, etc. Valuable for building mechanics, contractors, or others connected with building work. A complete set of Blue Prints included FREE while they last. Write today.

CHICAGO TECHNICAL COLLEGE

For 35 years . . . The School for Builders
S-126 Tech Building, 118 E. 26th St. Chicago, Ill.

Mr. Contractor:

Use Philippine Mahogany Plywood
for at least one room of the new house you are building.

- Beautiful paneling.
- Large 4' x 8' sheets.
- Inexpensive to install.
- Easy to finish.



SEE YOUR DEALER OR WRITE US FOR DETAILS

BUFFELEN LUMBER & MFG. CO.
TACOMA, WASHINGTON

FAMOUS STRONG MAN

*proves
strength of
Weldbord*



New low-cost HARDWOOD PLYWOOD wallboard with- stands flying iron ball!

This dramatic experiment is backed by laboratory tests that prove WELDBORD has the *highest structural strength of any wall-board!*

But greater strength is just one of many WELDBORD advantages. You can build walls not only stronger but harder, smoother and better-finished—at low-cost wall-board prices! Here are the facts:

WELDBORD costs less to finish. Hard, dense surface. Takes paint, natural-looking walnut or mahogany stain, or wallpaper... with no grain raise, no surface checking, no costly special treatments. Result: smooth, mar-resistant walls that help sell the finished building.

WELDBORD is easy to handle.

WELDBORD WINS

Joe Bonomo, "Hercules of the Screen," hurls a 16-pound iron ball at various wallboard materials. Photo shows ball *bouncing off* the hard WELDBORD panel.



BOARD X Crash! The heavy shot goes straight through a plaster-filled board.



BOARD Y Crash! The ball tears through a fibre composition board. Leaves a gaping hole.



BOARD Z Crash! A compressed wood composition board gives way under the force of the blow.

Light, large sheets ($\frac{1}{4}$ " thick. Sizes 96" x 48", 84" x 48", 72" x 48") eliminate waste... speed up construction.

WELDBORD retails at only 6¢ per square foot.* Much less in carload lots. Prices depend on location of lumber dealer. *6 1/2¢ ON THE PACIFIC COAST

TWO GRADES: *Water-resistant* (BLUE-LABEL)—for interior and temporary exterior use. *Waterproof* (RED-LABEL)—for permanent exterior use (slightly higher price).

*Send today for sample and
detailed information*

UNITED STATES PLYWOOD CORP.

EXECUTIVE OFFICES: 616 West 46th St., New York

MILLS: Algoma, Wis. • Birchwood, Wis.
Seattle, Wash. • Orangeburg, S. C.

BRANCH OFFICES AND WAREHOUSES:

Atlanta • Baltimore • Boston • Brooklyn • Chicago
Cincinnati • Cleveland • Detroit • Los Angeles
San Francisco • Newark • New York
Philadelphia • Rochester • Seattle

WELDBORD

HARDWOOD RESIN-BONDED PLYWOOD WALLBOARD



it's

Easy

with MESKER STEEL CASEMENTS

"I've found that Mesker Steel Casements are ideal for the houses that I build," says Mr. Harry E. Wolf, prominent Ft. Wayne builder, "BECAUSE THEY ARE

Easy to buy . . .
Easy to install . .
 and best of all, they
 make my houses
Easy to sell" . . .

You're right, Mr. Wolf, *easy* is the word for these modern, all-welded steel windows, and may we add . . . they're easy to open, easy to wash from the inside, easy to screen, and last but not least, they're easy on the eyes.



Write today for the big free Mesker Handbook of Steel Sash that makes it easy to buy and sell steel windows. State whether you are a dealer or a contractor.

Representatives: There are a few territories still available. Write today for full particulars.

Mesker

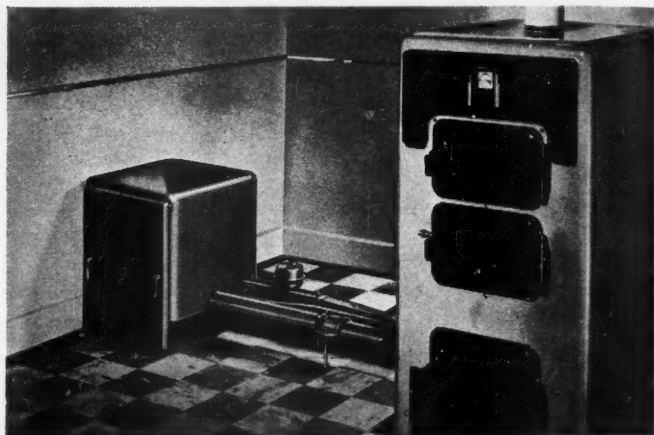
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MESKER BROS., 424 S. SEVENTH ST., ST. LOUIS, MO.

New and Improved Building Products

"Coal Flow" Stokers of Advanced Design

THE Iron Fireman Manufacturing Company of Portland and Cleveland has introduced an improved domestic "Coal Flow" series. The gear case and fan unit is mounted next to the wall of the coal bin, leaving a maximum amount of clearance immediately in front of the furnace or boiler. The feed worm extends into the coal bin. Power is transmitted to the worm by means of a sprocket and chain drive, which is completely sealed in a



IMPROVED bin feed "Coal Flow" stoker as installed

greased-packed housing. Feed worm, with a metering section of smaller diameter, is made of cold rolled alloy steel, which is wrapped around and welded to a steel core. A new "low-torque" agitator assembly is installed on the stoker, with improved bearing and mounting construction. The new spike cleanout is more accessible and more easily removed than the previous design. A Volumeter of refined design constantly adjusts the rate of air feed. Two low-torque agitators are installed. Made in sizes with capacities from 30 to 150 pounds of coal per hour. Teeple controls are installed.

New Size Asphalt-Coated Sheathing with T & G Edges

THE United States Gypsum Company, Chicago, is marketing a new asphalt coated sheathing with tongue and groove edges, a heavy non-penetrating asphalt covering, and is approximately
 (Continued to page 106)



WORKMAN applying new 2 - 8 foot size asphalt-coated sheathing.

TODAYS GREATEST MANUFACTURING OPPORTUNITY -----



LIGHT WEIGHT BIG SAVINGS

An improved design brick that saves 20% in weight and material in either faced or common. Reduces trucking costs, handles easier, lays faster, and builds a stronger wall.



Double and triple brick sizes further reduce costs. Permit hollow wall, fireproof masonry construction at cost level of frame.

OPPORTUNITY COMPLETE, READY-MADE FOR YOU IN YOUR LOCALITY—One that is proven—ready for you to cash in on the great building up-turn under way. It includes the essentials upon which sound and successful business enterprises are established.

SUPERIOR PRODUCT, LOW COST PRODUCTION—You will produce a material nearly 20% lighter in weight—A product in full range color or texture and capable of meeting all known building requirements—One accepted by Government and City Building Departments—Requiring 20% less material—Made by line-production machines.

EARNING POWER AND FUTURE—Present DUNBRIK-DUNSTONE Manufacturers already point the way for you. Some are selling output at 100% over cost. Others are getting as high as 80% of the brick business.

WE EQUIP YOU WITH LINE PRODUCTION MACHINERY—Large production—only one or two men. Equipment costs but fraction of other processes of equal capacity. Franchise granted covering your locality—protecting your market, business and future.

SEND FOR BOOK—"4 Keys to Success." It tells the complete story—How present manufacturers are making outstanding progress in this new industry—One that offers unlimited opportunity for growth, expansion and profit. Write today.



W. E. DUNN MFG. CO. 450 W. 24TH ST., HOLLAND, MICHIGAN

BUILDERS SAY: "It Gives Me A Big Advantage"

YOU CAN OWN IT FOR ONLY \$58.00

as shown, less motor with guard, mitre gauge, extension tables, belt and motor pulley.



A WALKER-TURNER 10" BENCH SAW GETS WORK DONE FASTER... SAVES LABOR... BOOSTS PROFIT ON JOBS

Think how much faster, easier, cheaper you could do a large part of your work if you had this tool. Certainly it would pay for itself in a hurry!

Compare its features and we think you'll agree it's the best, most serviceable portable saw for general use. Has full 3" capacity... broad table with extra extension for handling large pieces... worm gear controlled blade and tilting table... ball bearings... many other quality points detailed in NEW 1939 CATALOG. SEND COUPON FOR IT.

MONEY-SAVING POWER TOOLS FOR ALL BUILDING JOBS—Band Saws, Jointers, Tilting Arbor Saws, Belt and Disc Sanders, Shapers, Lathes, Drill Presses, Flexible Shafts, Motor Grinders.

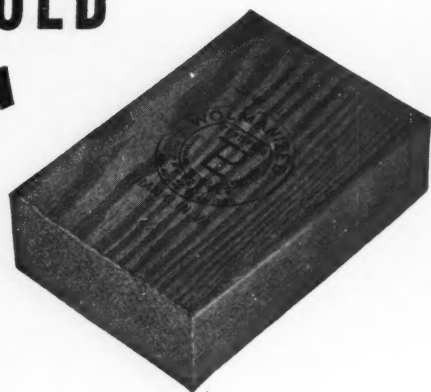
WALKER-TURNER *Engineered* POWER TOOLS

Walker-Turner Co., Inc.,
10128 Berckman St.,
Plainfield, N.J.

Send copy of new catalog of your Tools.

Name.....
Street.....
City.....

HOLD



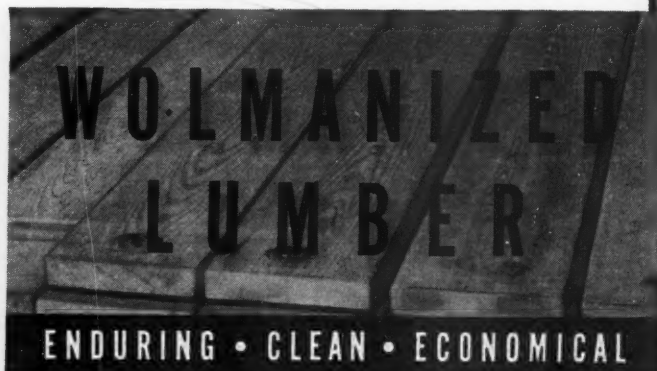
**...Wolmanized Lumber* is
safe to handle and it
builds better houses**

Hold a piece of Wolmanized Lumber, it is clean and odorless. It is safe to work and live with, but it's deadly to decay organisms and termites. That means reliable protection, and it also means economy, since handling costs aren't increased.

Wolmanized Lumber is becoming the favorite answer to the modern demand for enduring construction which is economical. Carpenters all like to use it, because like ordinary wood it is clean, can be painted, stained. Mr. Ultimate Consumer likes it, because it protects his house, yet adds less than 2% to the total cost. This remarkable economy results from strategic use only at danger points, such as sills, joists, subfloors. Banks and financing agencies recognize the extra value.

Your local lumber yard can supply Wolmanized Lumber. Fourteen treating plants are now supplying all parts of the country. For full information, write to AMERICAN LUMBER & TREATING COMPANY, 1406 Old Colony Building, Chicago.

*Registered Trade-mark



(Continued from page 104)

2 x 8 feet in size. Being of a new 2 x 8 foot size, it is easier to apply because it is placed horizontally, the way in which the carpenter is accustomed to apply sheathing. This permits cutting for openings to be made after the sheathing is applied. Even on a windy day, one man can safely and easily handle these boards on the scaffold.

No headers are required with the new sheathing. The tongue and groove assures tight, windproof joints. Studs do not have to space exactly 16 inches on center as they are always in sight.

The 2 x 8 foot size boards tie 7 studs together. The reduction in cutting and fitting needed with sheathing boards of this size considerably increases speed of application.

Waterproofed Asbestos Siding Shingles

PABCO Cyprus asbestos siding shingles, waterproofed in the process of manufacture, are being offered by the Paraffine Companies, Inc., San Francisco, Calif. These shingles are made in three attractive styles—with a wavy edge to give a Colonial effect, thatched, and in clapboard form. Each style comes in two pleasing colors—solid white, and silver light gray. The first is solid white throughout the thickness of the shingle; pure white cement is used, and for this reason they will remain white for the life of the building. They retain their natural colors and will not show streaks or stains, despite exposure to weather.



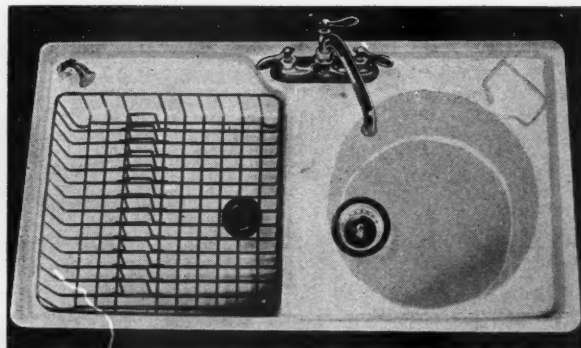
WAVY butt style waterproofed asbestos siding shingle for Colonial effect.

New Flat Rim Dishwashing Sink

A NEW flat rim two-compartment dishwashing sink, suitable for any home or apartment cabinet top, has been announced by the Ebco Manufacturing Company, Columbus, Ohio. It incorporates a number of new features which facilitate installation and enhance the attractiveness of the sink. With the two compartments, dish washing is made very simple.

A chrome-finished, swing-spout mixing faucet is placed on the back ledge of the sink, which also contains in one corner an integral soap dish, and in the other, the dish spray fixture. This arrangement removes all fixtures from the back wall. Particular attention has been given to making the rim of this sink especially level on all four sides, in order that an absolutely water-tight joint may be accomplished when the sink is installed in a linoleum, tile, metal or composition cabinet top.

This new Ebco sink is made of heavy cast-iron and finished in acid-resisting porcelain enamel in a choice of colors. The overall size is 20 x 38, with a round compartment of 16 inches in diameter and the square compartment 16 3/4 x 16. The filter is of the duo-strainer type, chrome finished.



DISHES are washed in bowl, sprayed in rack, then allowed to dry.

Slash.. 

MIXING COSTS

with a **FASTER, MORE DEPENDABLE**

3



handy, 2-wheel trailer-type mixers—fast, lightweight, well-balanced. Built like the big Smith Mixers, with proven ability to turn out more and better concrete per day than any other small mixer — yet they cost no more than most "tub" mixers.

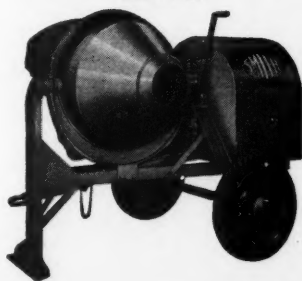
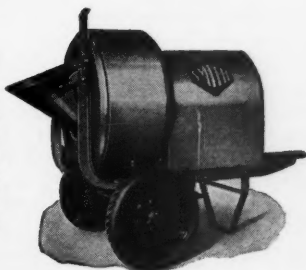


2 1/2-S MASCOT

The little mixer with the big mixer features: handy feed chute, famous "end-to-center" mixing action, fast "tilt and pour" discharge. Equipped with electric-welded, double-cone drum and roller bearing disc wheels with low pressure pneumatic tires. Solid rubber tires or plain steel wheels, if desired.

3 1/2-S BUDDY

A quality non-tilt mixer at competitive low price. Low height feed chute charging. Big diameter, narrow drum. Fastest mixing cycle. Simplified construction. Practically permanent lubrication. Fast portability. Choice of wheels and tires.



3 1/2-S TILTER

The champion of small mixers with the fastest mixing cycle in the industry. Big 31" wide feed chute. Famous "end-to-center" mixing action. Fast "tilt and pour" discharge. Tilting arc only 40°. Tilting lever at either end of drum. Choice of wheels and tires.

Mail coupon for literature.

SMITH MIXERS

THE BOULDER DAM MIXERS

The T. L. SMITH CO., 2849 N. 32nd St., Milwaukee, Wis.

Please send literature on:

☐ 2 1/2-S MASCOT ☐ 3 1/2-S BUDDY ☐ 3 1/2-S TILTER

Name.....

Address.....

RUTH'S BRIDGE CLUB

DISCOVERS MASONITE



HELEN — Have you ever seen a lovelier home?

JANE — It's certainly the last word in modern houses.

MARCIA — I think the walls and ceilings are beautiful!



HELEN — Ruth says they couldn't possibly have made the house so complete if it hadn't been for some wonderful new materials called MASONITE Products. The built-in desk, table and bookshelves and all the walls and ceilings are made of them.




RUTH — You're right, Helen. You'd be amazed at how really inexpensive all these modern effects are with MASONITE Products. And they're a joy to me — they're so easy to keep clean.

MARCIA — You've started something now, Ruth. We're all going to tell our husbands about MASONITE Products as soon as we get home.

• Ruth's cheery living-room combines streamlined beauty with practical utility. The walls and ceiling are MASONITE QUARTRBOARD. The walls are grooved with a smart block pattern. The built-in desk, table and bookshelves are TEMPERED PRESWOOD.

When your clients build or remodel, naturally they want the modern advantages of MASONITE Products. Be sure you know all about the permanent, expensive-looking results these gainless boards can produce — at a saving. MASONITE dealers can help your clients arrange new-building and remodeling loans under F. H. A.

Copyright 1938, Masonite Corporation

FREE! 

MASONITE
THE WONDER WOOD OF A THOUSAND USES
MASONITE CORPORATION, Dept. AB-12
111 W. Washington St., Chicago, Ill.

Please send me FREE samples and complete information about MASONITE — the Wonder Wood of a Thousand Uses.

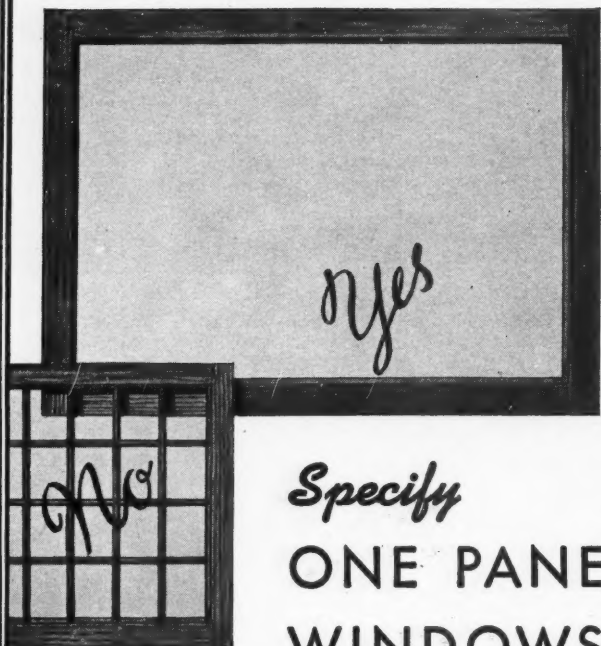
Name.....

Address.....

City..... State.....

A MISSISSIPPI PRODUCT
SOLD BY LUMBER
DEALERS EVERYWHERE

For MAXIMUM LIGHT—



Specify
**ONE PANE
WINDOWS**

If windows are to be for practical use rather than decorative, and serve their purpose of light transmission, then why not specify one pane, or the undivided windows?

In a test conducted by The Pittsburgh Testing Laboratories, it was found that the undivided window transmits from 8% to 30% more light than the divided window. And also there is less eye strain with an undivided window.

Consider the advantages of the one pane window and specify Clearlite Quality Glass.



EASY ON THE EYES

Fine Glass For Fine Buildings

FOURCO GLASS CO.

General Offices: CLARKSBURG, W. VA.

Branch Sales Offices

NEW YORK • CHICAGO • DETROIT • FT. SMITH, ARK.

Improved Spinner Disc Sander

THE American Floor Surfacing Machine Company, Toledo, Ohio, has recently made improvements in the American Spinner disc type edger used in surfacing edges of floors, borders, stair treads, halls, closets and other hard-to-get-at places. Due to such features as a free rolling disc guard and disc construction, this edger can sand right up to the baseboard or shoestrip without leaving a hair of unsanded surface. There is no need to remove the shoestrip.

A trouble-free heavy-duty 1½ H.P. motor, air cooled by a special fan, has been developed for this machine. A new type of flood light has been built in the front of the machine with an improved reflector and separate switch, making it possible for the operator to see how the work is progressing in dark corners. This sander is equipped with a new type of plug and socket connection, making it possible to detach the trailing wire. The machine has a precision balanced disc 7 inches in diameter with a grooved resilient rubber pad vulcanized to steel disc by special rubber-to-metal process. The disc speed is 3,000 r.p.m. The machine has a highly efficient dust pick-up system.



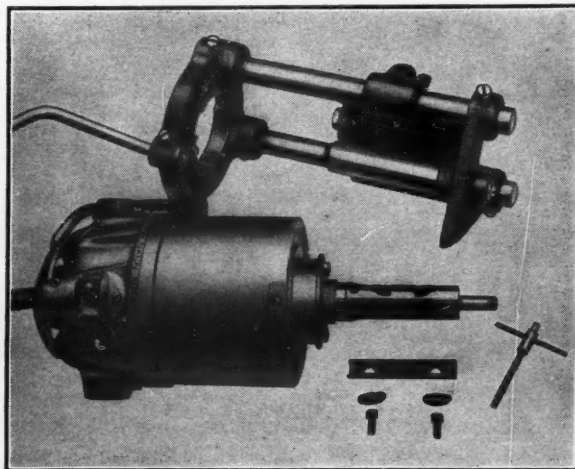
NEW features of spinner disc edger allow time and money saving jobs.

New Cutter for Planer and Jointer

A NEW and radically different planer and jointer cutter has recently been developed by the Unit Electric Tool Co., Inc., Syracuse, N. Y., to reduce the cutting effort approximately 50 per cent, and produce a smoother finish, regardless of grain direction. The cutter is comprised of a solid body, to which curved semi-circular blades are securely attached with plenty of chip clearance, allowing much freer cutting and quicker ejection of chips.

The outside clearance is "helical," giving greater support to the cutting edges and increasing the life.

When the blades become dull, they are shifted to a slightly different position, and ground radially while running, the cutter actually driving the grinding wheel that sharpens it. The blades are then shifted back to normal, and the clearance is perfect. Whether in the grinding or cutting position, the blades are exactly alike, as they are shifted together, mechanically.



PLANER and jointer cutter detached from grinding attachment, and with one blade removed. Each blade has two cutting edges for double life; when one edge is worn, the blade may be reversed.

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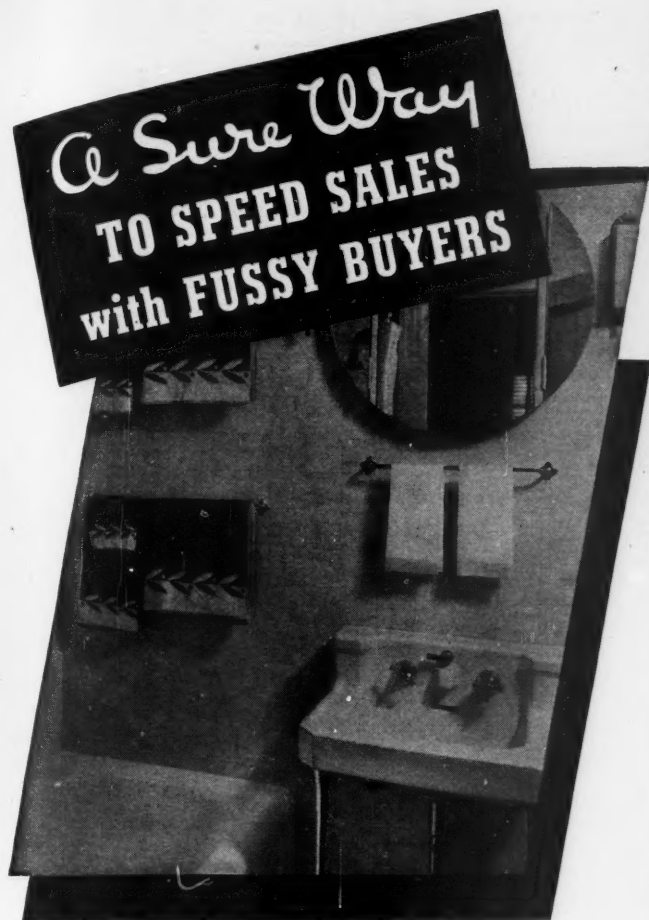
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MR. and Mrs. Prospect look over one of your jobs. They like it. The sale "looks good" . . . and then the Missus, who has been reading up and looking about . . . hesitates over those walls.

She's fussy. She wants "the last word" in construction . . . she wants *permanent, beautiful and easily cleaned walls* in the '38 style.

That's where colorful, successful Tile-Tex, the new decorative wall material, welcomes her inspection and *helps your sale*. She readily admits the modernity of Tile-Tex . . . instantly admires the exquisite colorings . . . visualizes how easily they can be kept clean.

For *new job* . . . or modernized . . . Tile-Tex Walls—and Floors—offer low cost and high efficiency . . . and our nearest Distributor has a real fact story for you. Write for his name and a copy of the new folder, "Decorative Walls By Tile-Tex."

TILE-TEX Company CHICAGO HEIGHTS ILLINOIS

OR YOU MIGHT CARE TO REPRESENT US IN YOUR TERRITORY

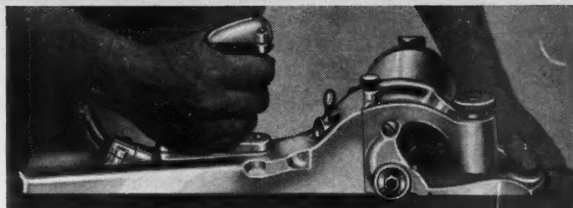
The Tile-Tex Company
Chicago Heights, Illinois

If my territory is open, I would like to have complete information on the Tile-Tex Dealer's proposition.

Name

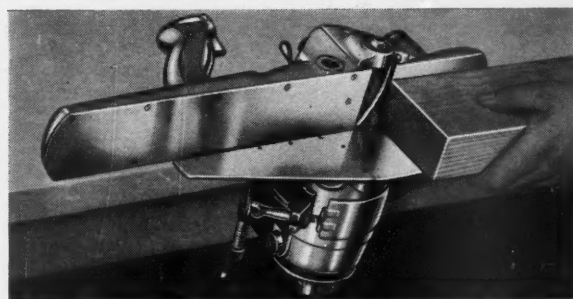
Address

COST CUTTING EQUIPMENT FOR LOWER COST HOUSING



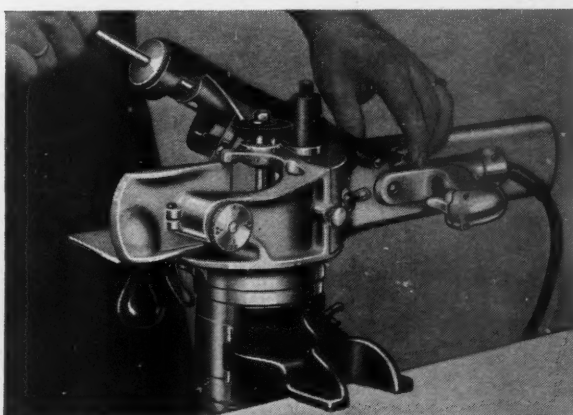
This new Carter Electric Plane is so much faster than hand planing that comparative figures lose their meaning. You have to see it fitting doors, sash, storm windows, screens and transoms to appreciate its cost cutting, profit making possibilities. Mounted in the bench bracket furnished, it instantly becomes a high speed jointer indispensable for inside trim work.

Powered with a 1 H.P. motor it is the largest, most powerful plane on the market. It will plane a surface up to 2½" wide. In spite of its power it is light because it is made from aluminum alloy.



Other features: *Spiral Cutter* makes smooth, waveless cuts with or across the grain without splintering the edges. *Quickly Adjusted* for paper thin or heavy cuts up to ¾ of an inch. *Sharpens its own cutter*.

Would you like more information on this new electric plane?



R. L. CARTER DIVISION, The Stanley Works
133 Elm Street, New Britain, Conn.

Tell me more about your new powerful electric plane.

Name

Address

CARTER MONEY MAKING TOOLS



Armco Galvanized PAINTGRIP SHEETS saved this builder **MONEY!**

As soon as the sheet-metal men were through, the painters were right on the job. No time wasted for weathering. No zinc-destroying acid washes to make the metal ready.

Armco Galvanized PAINTGRIP Sheets are prepared at the mill for immediate painting. Bonded with the zinc coating is a neutral surface film. This takes paint at once, and holds it. The film also separates the paint and the zinc, thus preventing the zinc compounds from drying out the elastic properties of the paint. This assures much longer paint life.

All exposed sheet-metal work—downspouts, gutters, flashing—lasts longer when made of this greatly improved galvanized metal. Paint lasts longer, which will please your customers.

Specify Armco PAINTGRIP Galvanized Sheets when ordering sheet-metal work. There is an Armco Distributor or sheet-metal contractor nearby who will be glad to serve you. Write us if you do not know their names. The American Rolling Mill Company, 3381 Curtis Street, Middletown, Ohio.

Armco Galvanized PAINTGRIP Sheets



News of the Month

Building Activities and Meetings

October Residential Volume Highest of Any Month Since 1930; 1938 Total to Exceed 1937

WITH a residential construction volume of \$112,673,000 for the month of October as recorded in F. W. Dodge Corporation figures for 37 eastern states, a new high was reached in home building recovery as this is the largest figure recorded since the spring peak of 1930. For the first half of November a residential volume of \$40,928,000 compares favorably with \$32,703,000 for the same period last year, although the percentage of improvement is not as great as the previous month. Comparative October figures and those for the first half of November are as follows:

37 Eastern States	October '38	October '37	Nov. 1-15, '38
Residential	\$112,673,000	\$ 65,485,000	\$ 40,928,000
Non-Residential	131,020,000	75,295,000	46,236,000
Public Works	92,829,000	48,031,000	34,357,000
Utilities	21,176,000	13,270,000	7,692,000

Total	\$357,698,000	\$202,081,000	\$129,213,000
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According to Dodge estimates a construction total of \$3,200,000,000 should be reached for 1938, as compared to an actual total of approximately \$2,900,000,000 in 1937. None of these figures includes repairs and maintenance work. It is pointed out that the total building and engineering volume recorded from Jan. 1 through Nov. 15 of this year reached a total of \$2,635,000,000 compared with \$2,599,000,000 in the corresponding period of 1937, and that considerable letting of public works contracts before the end of this year should materially increase the spread between the final 1938 and 1937 figures. For 1939, indications of increased volume in public and private residential building, commercial, factory, and public utility construction are stated to be very good.

Westinghouse Announces Complete Line of Home Heating, Air Conditioning Equipment

WESTINGHOUSE Electric & Mfg. Co., has announced the addition of home heating and air conditioning equipment to complete a line including oil, gas, and coal-fired winter air conditioning units suitable for the addition of summer cooling equipment; hand-fired coal gravity warm-air furnaces offering both



WESTINGHOUSE executives inspecting new heating line.

steel and cast-iron construction; and an automatic gravity gas-fired warm-air furnace. The new Westinghouse line now covers every phase of market requirements from low-price models through to de luxe completely automatic year-around home heating and air conditioning systems and including "zone control" of temperature for large, unusual heating conditions.

Announces Formation of Fiberglas Corp.

OWENS-ILLINOIS Glass Company and Corning Glass Works have announced the formation of Owens-Corning Fiberglass Corporation, which will produce a variety of products made from fiber glass. The result of the extensive research

(Continued to page 112)



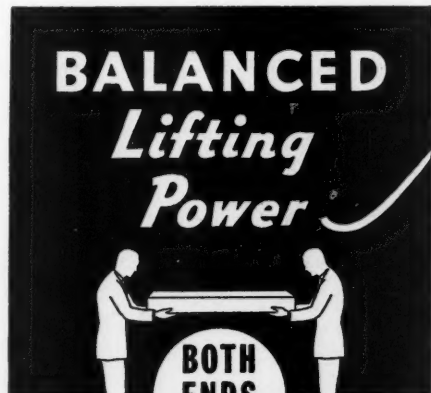
It will help you to better profits

Every builder should read this 16-page booklet. It lists the essentials of good lime, tells something of its manufacture, gives specifications, contains valuable hints on plaster as applied to various bases, provides helpful suggestions on textured and colored finishes and exterior stucco.

Incidentally, it thoroughly describes Ohio

Hydrate Lime Products and their manufacture. Learn more about the possibilities of these materials by writing for a copy of the booklet . . . The Ohio Hydrate & Supply Company . . . Woodville, Ohio.

OHIO PRODUCTS SOLD EVERYWHERE IN FAMOUS ZIG ZAG BAGS
 Ohio White Finish—Hawk Spread White Finish—Ohio Rite-wall Fibered Lime Plaster—Ohio Sanlime Finish—Mastite Masonry Mortar—Ohio Masons Lime—Ohio Ground Lime.



Brings You

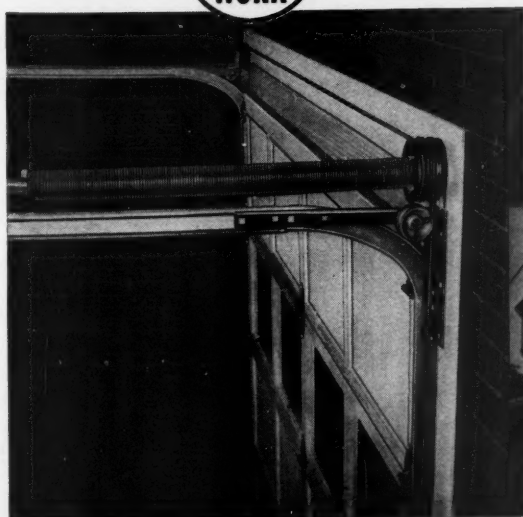
ALL SIX OF THESE ADVANTAGES!

in the Rō-WAY Model "J"
 (Popularly Priced)

1. Absolutely no Side-Drift
2. Never any Binding
3. Amazing ease of Operation
4. Quiet Free-Coasting Action
5. No adjustments to make at any time
6. Much simpler installation

Rō-To Live Spring (Patented)

Instead of *two* springs to supply lifting power to the *two* sides of the door, we use *one* Rō-To Live Spring . . . a single, powerful, full-floating coil which gives a smooth, evenly-balanced lift to *both* sides of the door at the *same* time . . . *always*. The Rō-To Live Spring (Patented) uses each end of the torsion spring for lifting power . . . no dead ends. Energy from each end of the live-floating spring is applied to each cable drum. One drum revolves clockwise . . . the other counter-clockwise.



Other Models of Rō-Way Doors are available for all sizes . . . all buildings . . . electrically operated if desired.

NO OFFSET BRACKETS Track Always Protected

Vertical tracks attach directly to the door jamb. No track brackets used. Ball bearing steel track rollers built in rubber tires . . . will not stretch nor become loose. Caststeel preformed lifting cables are used. These features insure quieter operation. Headroom requirement, 9" to 14". Sideroom requirement, only 8 3/4".

Write for descriptive Folder and Price List

ROWE MANUFACTURING CO.
 774 Holton St., Galesburg, Ill., U. S. A.

NORTHERN HURRICANE!

The Office of
John S. M. Glidden
**NATICK FEDERAL
SAVINGS AND LOAN ASSOCIATION**
Incorporated 1886
NATICK, MASS. October 4, 1938

Mr. F. Vaux Wilson
Homasote Company
Trenton, N. J.
Dear Mr. Wilson:

We hold a mortgage on a Cape Cod Homasote Precision-Built house which was built on the west side of Lake Cochituate, Natick, Massachusetts.

Last week on September 22, 1938, we experienced a severe hurricane. In Natick we received our full share of damages, being in one of the areas hardest hit. It was reported that the hurricane swept across the lake at 94 miles per hour hitting the Precision-Built house with full force.

I believe you may be interested to know that this house is in perfect condition after a most severe test.

Very truly yours,
(Signed) John S. M. Glidden
Treasurer



To the Makers of Homasote:
Dear Sirs:
Box 133, Norwich, Conn.
September 29, 1938

During the hurricane of September 21st, 1938, there was nothing between our 16x20 Homasote cottage and the sea, save 100 feet of empty lot. At the peak of the storm, the ocean rose, completely surrounding the cottage, huge breakers dashing against it. A tidal wave so tremendous that we can only guess at its height rolled over the cottage; on either side of it, sturdy frame cottages collapsed into kindling that was swept away.

Yet after the storm had subsided, our Homasote cottage still stood, not one inch off its foundation! From a relatively safe spot in one of the few houses now left on Groton Long Point, Conn., I watched every stage of the hurricane, expecting momentarily to see our little "Dinghy" still it stood.

A few shingles were off the roof, of course; but there would have been absolutely no other damage had it not been for the fact that a huge piece of roof from a nearby wrecked cottage was blown with terrific force against one of the Homasote panels, tearing a hole in it. With the gale suddenly entering the cottage, one of our "upstairs" windows blew out, not in, taking with it another piece of paneling. Elsewhere, the Homasote was intact, not even bulging.

Naturally, the interior was a shambles of broken dishes and soaked, topsy-turvy furniture; but everything dried out, and, once cleaned up, if course, the two boarded-up holes.

We felt you would be glad to know that your product stood up under the most unusual conditions it could ever encounter. To say that we are amazed and incredulous is a gross understatement—increasingly thankful are we that we are of the usual money we had into Homasote instead as impressed as we are. But perhaps you are not shore from ill-fated Misquamicut, B. I., was a prosperous summer colony of 350 houses, many of them 2- and 3-story, well-built, costly homes. Now there are possibly 60-odd left that might be salvaged—the rest are matchwood. Some ten or more cannot even be found, and 12 deaths occurred during the storm, which reached a proven velocity of 188 m. p. h. at one stage. Yet our Dinghy needs only two 12x4 panels, a window and some shingles to restore it. Now how do you feel? We feel fine, thank you!

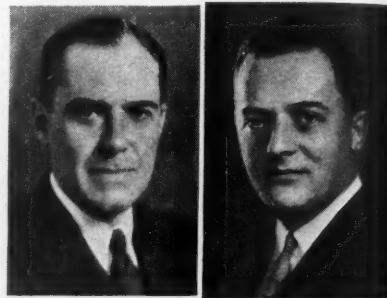
Gratefully,
(Signed) Aileen G. Corey
(Mrs. Herbert H. Corey)

We are proud of these and many similar letters regarding Homasote performance. Winter and Summer, we store Homasote outdoors. We know it is weatherproof! Homasote Company • Trenton, N. J.

Weatherproof
HOMASOTE
Insulating and Building Board

(Continued from page 110)

facilities of these two companies, the products to be manufactured by the new corporation promise revolutionary developments in many fields of insulation, construction and industrial design. The announcement was made jointly by Amory Houghton, chairman of the board of the new company, and Harold Boeschstein, president. It marks the culmination of development work by the two companies involving expenditures totaling about \$5,000,000.



HAROLD BOESCHSTEIN, president, (left) and **Amory Houghton**, chairman of the board, **Owen-Corning Fiberglass Corporation**.

Schedule Association Meetings for Winter Season

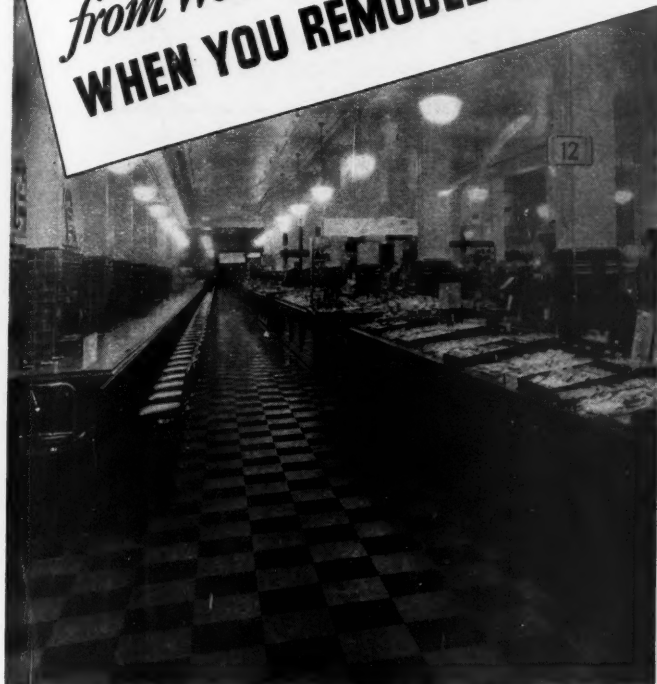
THE following groups in the building industry have made arrangements for meetings and conventions to be held on the dates and at the places listed below.

- Jan. 10-12—Indiana Lumber & Builders' Supply Assn., Claypool Hotel, Indianapolis, Ind.
- Jan. 11-13—Middle Atlantic Lumbermen's Assn., Bellevue-Stratford Hotel, Philadelphia, Pa.
- Jan. 17-19—Northwestern Lumbermen's Assn., Civic Auditorium, Minneapolis, Minn.
- Jan. 17-20—Ohio Assn. of Retail Lumber Dealers, Deshler-Wallick, Columbus, O.
- Jan. 23-25—Mountain States Lumber Dealers' Assn., Shirley-Savoy Hotel, Denver, Colo.
- Jan. 23-26—American Society of Heating and Ventilating Engineers, Pittsburgh, Pa.
- Jan. 24-26—Northeastern Retail Lumbermen's Assn., New York City.
- Jan. 24-26—Kentucky Lumber & Supply Assn., Brown Hotel, Louisville, Ky.
- Jan. 25-27—Southwestern Lumbermen's Assn., Auditorium, Oklahoma City, Okla.
- Jan. 31-Feb. 3—Michigan Assn. of Retail Lumber Dealers, Pantlind Hotel and Municipal Auditorium, Grand Rapids, Mich.
- Feb. 1-3—Iowa Assn. of Lumber & Building Material Dealers, Des Moines, Ia.
- Feb. 7-9—Concrete Industries Exposition and Conventions, Sherman Hotel, Chicago, Ill.
- Feb. 7-9—Illinois Lumber & Material Dealers' Assn., Stevens Hotel, Chicago, Ill.
- Feb. 8-10—Lumber Dealers' Assn. of Western Pennsylvania, William Penn Hotel, Pittsburgh, Pa.
- Feb. 10—Tennessee Lumber, Millwork & Supply Dealers' Assn., Nashville, Tenn.
- Feb. 14-16—Wisconsin Retail Lumbermen's Assn., Milwaukee Auditorium, Milwaukee, Wis.
- Feb. 16-17—Virginia Building Material Assn., to be announced.
- Feb. 22-24—Nebraska Lumber Merchants' Assn., Municipal Auditorium, Omaha, Nebr.
- Feb. 23-25—Western Retail Lumbermen's Assn., to be announced.
- Mar. 1-3—American Concrete Institute, Roosevelt Hotel, New York City.
- March 17—Florida Lumber & Millwork Assn., Orlando, Fla.
- Apr. 10-13—Lumbermen's Assn. of Texas, Beaumont, Tex.
- May 25-26—National Assn. of Commission Lumber Salesmen, Peabody Hotel, Memphis, Tenn.

Change Names of Two Celotex Products

THE Celotex Corporation has changed the name of what was formerly known as Traffic Board to Protection Board, used as protection course for waterproofing membranes, cushioning wood block floors and for surfacing cow stalls. The name, Promenade Traffic Top, a resilient, protective surfacing for recreational roofs, has been shortened to Traffic Top.

*Take a tip
from Woolworth*
WHEN YOU REMODEL STORES



[ATTRACTIVE, DURABLE FLOORS for this huge Woolworth store in Los Angeles are Armstrong's Linotile (Oil-Bonded)—made by the makers of Armstrong's Linoleum. Linotile—in plain and marble colors—is sold and installed by authorized Armstrong floor contractors in all parts of the country.]

Specify Long-Lasting Floors Of Linotile (Oil-Bonded)

NEXT time you figure on a store remodeling job, let the experience of F. W. Woolworth's store designers help you select the flooring. Specify Armstrong's Linotile (Oil-Bonded).

This Los Angeles Woolworth store uses Armstrong's Linotile because this colorful, resilient flooring is built to stand up against wear and tear. The colors run through the full thickness of the composition. Scuffing feet do not wear them off.

Linotile is even more resistant to indentation than battleship linoleum. Reasonable in first cost, it can be economically installed over suspended wood or concrete subfloors. It is easy to clean.

Write today for our free book of floor-design suggestions—"Handlaid Floors." Armstrong Cork Company, 1218 State Street, Lancaster, Pa.

Armstrong manufactures the only complete line of resilient floors: Linotile (Oil-Bonded), Asphalt Tile, Linoleum, Reinforced Rubber Tile, and Cork Tile. Therefore, our Architectural Service Bureau can offer you unbiased assistance in choosing floors for every purpose or budget.



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Armstrong's **LINOLEUM**
and **RESILIENT, NON-CERAMIC TILES**
CORK TILE • LINOWALL • ACOUSTICAL CEILINGS

The WESTERN PINES
make a
PERFECT ENTRANCE

Says Mr. A. J. Pietsch



Mr. A. J. Pietsch, builder and cabinet maker of Milwaukee, Wis., in front of a home he recently completed. The Western Pines were used for both interior and exterior work.

"Uniformly excellent in quality, well-seasoned, and durable, the Western Pines are particularly fine for doorways, window casings, etc.," says Mr. Pietsch. "In 27 years as a builder and cabinet maker, I have used an *increasing amount* of Western Pines.

"Now the Western Pines constitute the bulk of woods used in my shops. My customers like it—my best workmen OK it."

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LETTERS from Readers on All Subjects

Facts, opinions and advice
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Builders' Association Active

Buffalo, New York.

To the Editor:

You have never heard from the residential contractor as a group. We have an organization of these business men which has been in existence since last spring. The purpose of this letter is to acquaint you with this fact and the reasons for such an organization.

This type of individual, by the very nature of his business, is responsible for the residential construction activity in this area with the accompanying employment of the numerous trades and industries. These industries and craftsmen rely upon the activities and integrity of this particular individual. He has developed and will continue to develop millions of dollars worth of business in this area. Yet, his experience, ability, and practical knowledge have seldom been consulted or considered—rather, he has been consistently ignored in matters which vitally concern him and thus the welfare of the entire residential field. Certain groups have even attempted to capitalize upon the malignment of his character and activities.

The purpose of this organization is to better the conditions in the residential contracting field with the resultant strengthening of the entire structure for those concerned as well as the general public. Most contractors today are operating their business as any other professional man would, realizing that future business is dependent upon good will based upon service, quality, and experience.

The activity of this organization will result in better housing, more secure means of operation, and a definite recognition of the profession of residential construction.

If there is any way in which this group can aid you in some common problem, feel free to call upon us.

THE NIAGARA FRONTIER BUILDERS' ASSN., Inc.

J. Harold Genrich, Secretary.

Tru-Cost Speeds Estimating

Peterborough, Ont., Canada.

To the Editor:

We have examined the Tru-Cost System of estimating and are of the opinion that it would speed up the work in our Estimating Dept. and increase its accuracy.

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(Lumber, Builders' Supplies Millwork and Fuel).

F.D.R. Home Makes Hit

Terre Haute, Ind.

To the Editor:

On pages 50 and 51 of your November issue appear illustrations and descriptive matter of the Franklin D. Roosevelt home.

A number of our customers will be pleased to have this information and we desire to have it reproduced, if we may have your permission to do so. Please let us know if it will be agreeable with you for us to reproduce these two pages.

AMERICAN REALTY COMPANY,

By Howard L. Hyatt, Secretary.

Tru-Cost In West Indies

Port of Spain, Trinidad, B.W.I.

To the Editor:

I have been purchasing your magazine from our book stalls for some time now and I have decided to enter my subscription annually with you so as not to miss a number. Your TruCost estimating articles have been fine and I am trying them out much further; they have been real labour saving in estimating and easily made adaptable to our local services.

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Contractor & Builder.

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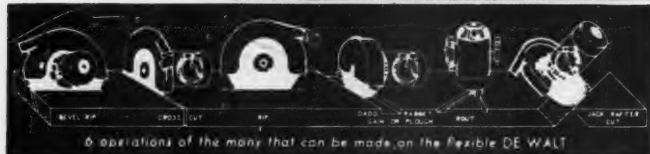
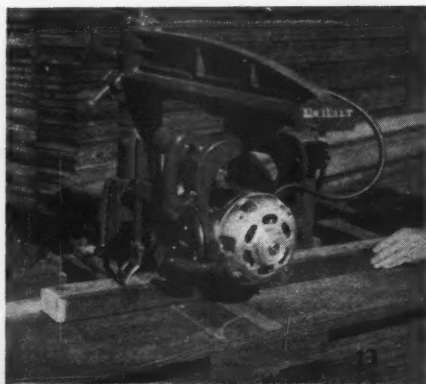
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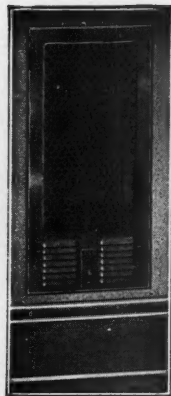


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
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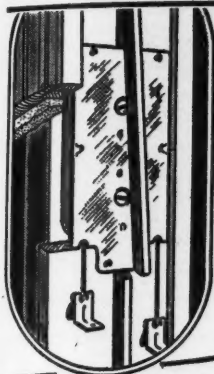
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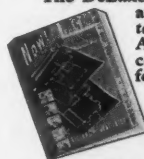
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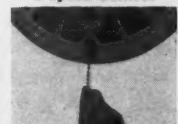
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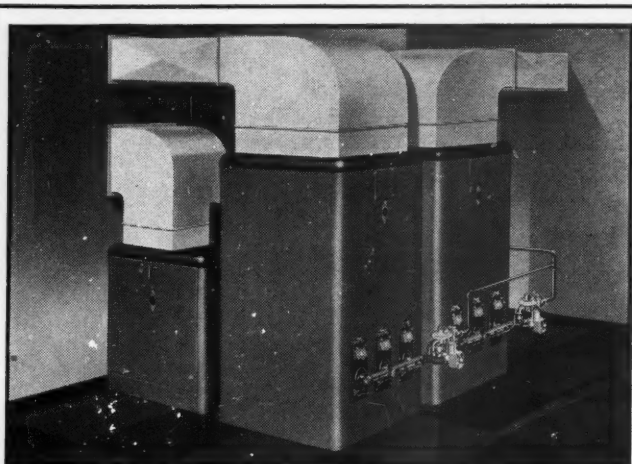


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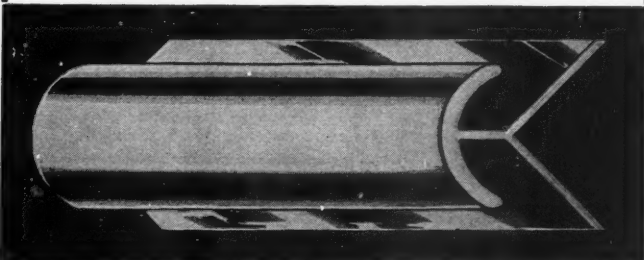
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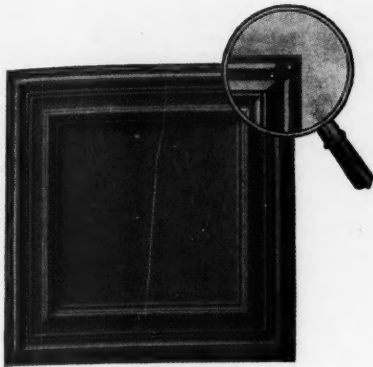
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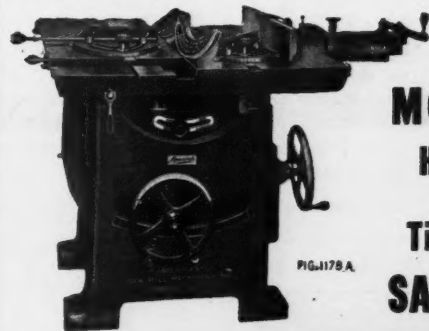
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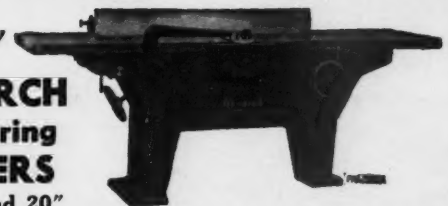
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302—"Information on Super-Harbord"—A well illustrated descriptive catalog and grade use guide on Super-Harbord and other plywood products is just off the press. It discusses the use of outdoor plywood for homes, service stations, lumber yards, industrial and utility buildings. It also covers use of plywood for concrete forms, boats, signs, farm uses and a score of other applications.—HARBOR PLYWOOD CORP., Hoquiam, Wash.

303—"The Plywood Catalog," New Edition, Fall 1938—32 pages, beautifully illustrated and filled with definite information regarding the stock size panels, with their prices, carried by the Algoma Division of the U. S. Plywood Corp. Included are the sensational new Weldbord, the all-hardwood plywood wallboard, together with a complete line of Douglas fir plywood, gum, birch, walnut, maple, whitewood, mahogany, Philippine hardwoods, oak, knotty cedar and pine, Flexwood, Plybestos, fancy figured woods, California pine, Micarta, Arm-orply, Weldwood and Algonite. An ideal reference book for dealers, architects and contractors.—UNITED STATES PLYWOOD CORP., 616 W. 46th St., New York City.

304—Resnprest Plywood—Five new folders present the wide uses for Resnprest, all-purpose, all-weather plywood bonded with phenol formaldehyde resin by the hot plate process. The titles of these folders suggest their contents: "Enduring Signs of All Kinds," "Resnprest on the Farm," "Build Your Boat with Resnprest," "Cut Your Modernizing Costs with Resnprest," and "Specifications and Instructions." This last folder diagrams four practical methods of installing Resnprest: (1) flush wall, invisible joint; (2) modern streamlined batten joints; (3) shiplap type joint; and (4) "lap and vee" joint. This folder also contains complete information on finishing Resnprest.—M AND M WOODWORKING CO., Portland, Ore.

305—Circular Saws—"Saw Catalog No. 38" presents information regarding inserted and solid tooth circular saws in diameters ranging from 6 to 72 inches for the solid tooth saws, and from 12 to 72 inches for the inserted tooth saws. Information regarding grooving or dado heads, special saws of various kinds and saw dressing tools included.—AMERICAN SAW MILL MACHINERY CO., Hackettstown, N.J.

306—American Floor News—What is said to be "the only paper published exclusively for the floor sanding trade" carries the above title and is issued from time to time and distributed free to some 15,000 to 20,000 floor surfacing contractors and dealers. It tells what other men are doing in the floor surfacing business, ideas are swapped, and new data concerning floor surfacing are presented. Floor surfacing contractors interested can have their names added to this mailing list.—THE AMERICAN FLOOR SURFACING MACHINE CO., Toledo, Ohio.

307—Corbin Residence Hardware—A most attractive art catalog and design book carrying the above title has 48 pages and covers with illustrations attractively presented in two colors. It presents data gathered for a considerable period from leading architects, builders and dealers, and should simplify the task of those whose job it is to select finishing hardware. Twelve different architecturally styled homes, each with its appropriate hardware, are illustrated as just one of the features of this new book.—P. & F. CORBIN, New Britain, Conn.

308—"Building Dollars Are Coming Back"—Under this title a tricky folder has been prepared showing details of "correct wood construction for homes that endure" in Arkansas soft pine's "ten cardinal points." Ten popular items of Arkansas soft pine lumber and millwork are also effectively illustrated in this folder.—ARK-

ANSAS SOFT PINE BUREAU, Boyle Bldg., Little Rock, Ark.

309—New Kawneer Window Bulletin—Two new 6-page data sheets present interesting illustrations, details and facts on the new Sealair windows, Series 120 and Series 220. These windows are offered in aluminum or bronze, and are appropriate for use in homes, schools, apartments, hotels, hospitals, etc.—THE KAWNEER CO., Niles, Mich.

310—"Doors Go Modern"—A new 3-page data sheet introducing "The Zephyr," a smart new streamlined door for modern interiors. This is a hollow core door with beautifully decorated flush faces. It embodies the sturdy "Airways" construction. A companion piece is a 4-page data sheet, "Charming Colonial Front Entrances," illustrating six authentic styles to add dignity and beauty to any modern home.—ROCK ISLAND SASH & DOOR WORKS, Rock Island, Ill.

311—Stover Fireplace Construction and Building Specialties—Catalog No. 3193 is a 16-page illustrated booklet showing details of the Stover "Improved" dome damper with several types of control, together with other iron specialties, such as andirons, ash drops, cleanout doors, coal windows, garbage containers and kitchen ventilating fans.—STOVER MFG. & ENGINE CO., Freeport, Ill.

312—Kimsul Architects' Data Book—A 20-page portfolio gives useful information in A.I.A. form of Kimsul expanding blanket insulation. Chapters discuss the physical properties of Kimsul, tell how to insulate vertical walls, sloping roofs, ceilings, floors, odd corners and spaces, how to estimate the quantity required, heat losses through different thicknesses, fuel savings, moisture problems and suggested specifications.—KIMBERLY-CLARK CORP., Neenah, Wis.

313—Chart of "Thermal Properties of Frame Walls"—A large size illustrated wall chart under the above heading illustrates various standard kinds of wall construction and analyzes the insulation value of each. Four values for each type of construction are given: (1) conductivity; (2) per cent of heat that may be saved on walls by the particular insulation noted; (3) resistance of the wall to heat transmission, and (4) the surface temperature on outside walls with an inside temperature of 70 degrees and an outside temperature of zero. Lumber and building supply dealers, architects and contractors will find this interesting information to have.—GENERAL INSULATING AND MFG. CO., 705 Olive St., St. Louis, Mo.

American Builder,
105 W. Adams St.,
Chicago, Ill.

(Dec., 1938)

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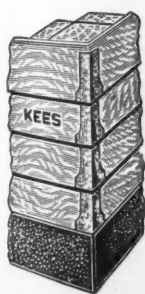
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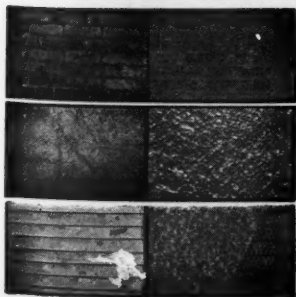
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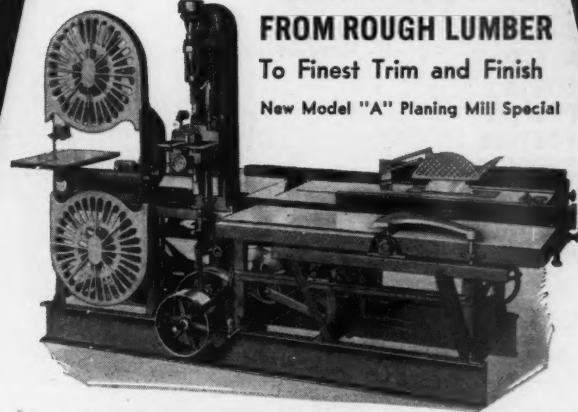
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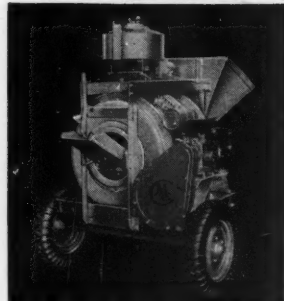
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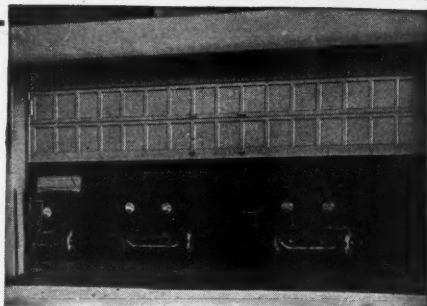
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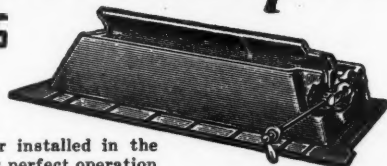
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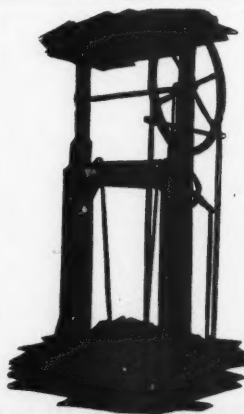
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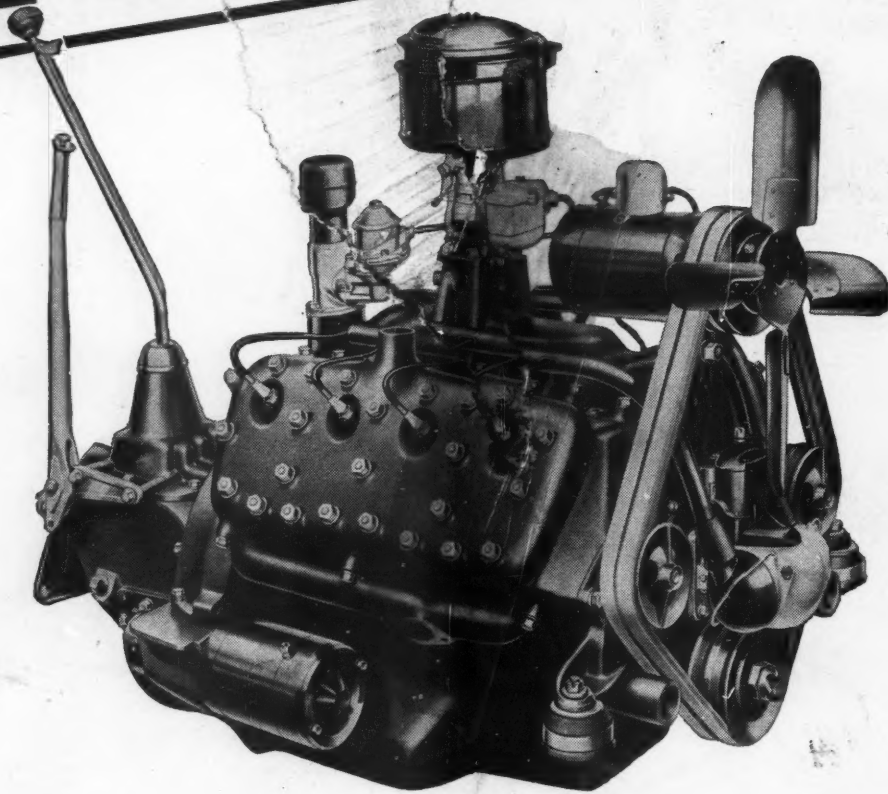
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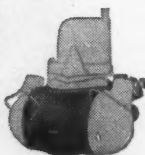
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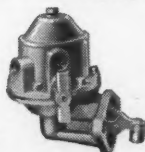
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